NASA SP-7011 (2)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY

WITH INDEXES

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

This bibliography was prepared by the NASA Scientific and Technical Information Facility operated for the National Aeronautics and Space Administration by Documentation Incorporated.

NASA SP-7011 (27)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY

WITH INDEXES

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA Information System during July, 1966

Scientific and Technical Information Division
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
WASHINGTON, D.C. AUGUST 1966

INTRODUCTION

Aerospace Medicine and Biology is a continuing bibliography which, by means of periodic supplements, serves as a current abstracting and announcement medium for references on this subject. The publication is compiled through the cooperative efforts of the Aerospace Medicine and Biology Bibliography Project of the Library of Congress (LC), the American Institute of Aeronautics and Astronautics (AIAA), and NASA. It assembles, within the covers of a single bibliographic announcement, groups of references that were formerly announced in separate journals, and provides a convenient compilation for medical and biological scientists. Additional background details for this publication can be found in the first issue, NASA SP-7011, which was published in July, 1964. Supplements are identified by the same number followed by two additional digits in parentheses.

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the earth's atmosphere or in interplanetary space. References describing similar effects on biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis will be placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion. The contents of this issue are comprised of abstracts that were prepared by the three contributing organizations.

Each entry consists of a standard citation accompanied by its abstract. It is included in one of three groups of references that appear in the following order:

a. NASA entries identified by their *STAR* accession numbers (N66-10000 series),
b. AIAA entries identified by their *IAA* accession numbers (A66-10000 series); and
c. LC entries identified by a number in the A66-80000 series.

Many of the abstracts included in this publication have been reproduced from those appearing in *STAR* and *IAA*. This procedure, adopted in the interests of economy and speed, has introduced some variation in size, style, and intensity of type.

AVAILABILITY OF DOCUMENTS

STAR Entries

NASA documents listed are available without charge to:

1. NASA Offices, Centers, contractors, subcontractors, grantees, and consultants.
2. Other U.S. Government agencies and their contractors.
3. Libraries in the United States that maintain collections of NASA documents for public reference.
4. Other organizations in the United States having a need for NASA documents in work related to the aerospace program.
5. Foreign government or academic (university) organizations that have established reciprocal arrangements for the exchange of publications with NASA, that have current agreements for scientific and technical cooperative activities with NASA, or that have agreements with NASA to maintain collections of NASA documents for public use.

Non-NASA documents listed are provided by NASA without charge only to NASA Offices, Centers, contractors, subcontractors, grantees, and consultants.

Organizations and individuals not falling into one of these categories may purchase the documents listed from either of two sales agencies, as specifically identified in the abstract section:

Clearinghouse for Federal Scientific and Technical Information (CFSTI), Springfield, Virginia 22151

Superintendent of Documents (GPO) U.S. Government Printing Office Washington, D.C. 20402

Information of the availability of this publication and other reports covering NASA scientific and technical information may be obtained by writing to:

Scientific and Technical Information Division
National Aeronautics and Space Administration
Code USS-AD
Washington, D.C. 20546

Collections of NASA documents are currently on file in the organizations listed on the inside of the back cover.

(continued)

IAA Entries

All articles listed are available from the American Institute of Aeronautics and Astronautics, Technical Information Service. Individual and Corporate AIAA Members in the United States and Canada may borrow publications without charge. Interlibrary loan privileges are extended to the libraries of government agencies and of academic nonprofit institutions in the United States and Canada. Loan requests may be made by mail, telephone, telegram, or in person. Additional information about lending, photocopying, and reference service will be furnished on request. Address all inquiries to:

Technical Information Service
American Institute of Aeronautics and Astronautics, Inc.
750 Third Avenue, New York 17, New York

For further details please consult the *Introductions* to *STAR* and *IAA*, respectively.

LC Entries

Articles listed are available in the journals in which they appeared. They may be borrowed or consulted in libraries maintaining sets of these journals. In some instances, reprints may be available from the journal offices.

AVAILABILITY OF THIS BIBLIOGRAPHY

Copies of *Aerospace Medicine and Biology* (SP-7011) and its supplements can be obtained from NASA (Code USS-A), without charge, by NASA offices and contractors, U.S. Government agencies and their contractors, and organizations that are working in direct support of NASA programs.

Other organizations can purchase copies of the bibliography from the Clearinghouse for Federal Scientific and Technical Information, Springfield, Virginia 22151.

TABLE OF CONTENTS

NASA

AEROSPACE MEDICINE AND BIOLOGY

a continuing bibliography AUGUST 1966

STAR ENTRIES

N66-23928*# Washington Univ., Seattle. Psychophysics Lab.
STUDIES OF THE CONSTANT ERROR
Don A. Ronken and Eugene Galanter 1 Nov. 1965 41 p refs
Sponsored in part by NASA
(Contract Nonr-477(34))
(NASA-CR-74695; PLR-14N; AD-629678) CFSTI: HC $2.00/MF $0.50 CSCL 05J

A series of experiments are reported in which attempts are made to study the role of stimulus variables that may affect the magnitude of the constant error. The results indicate that in addition to bias effects that cannot rightly be ascribed to the stimulus, there are certain forms of potential sequential biases that may or may not be stimulus induced. The classical experiment to investigate the phenomenon is redesigned, and some preliminary results are presented to show that the technique is feasible. Author (TAB)

N66-23933# Washington Univ., Seattle. Psychophysics Lab.
ON THE INADEQUACIES OF A LIMITED-STATE THEORY OF THE THRESHOLD
Moncrieff H. Smith, Jr. [1965] 19 p refs
(Contract Nonr-477(34))
(PLR-15N; AD-629679) CFSTI: HC $1.60/MF $0.50

A three-state model of detection, based very closely on Luce's two state model, has been proposed and examined in the context of the psychophysical experiment. Although most of the data used to test the model are of doubtful relevance, being of the confidence-judgment variety, they do serve to warn of the possibility of individual differences between subjects. Some subjects may shift from one attitude to another by a change in pure response bias. For most subjects, however, including one run under appropriate conditions, the data did not support the model. Author (TAB)

N66-23977# Buenos Aires Univ. (Argentina).
RADIATION DAMAGE IN MUSCLE MEMBRANES AND REGULATION OF CELL METABOLISM Annual Report, Jan. 1–Dec. 31, 1965
Adolfo Portela Dec. 1965 61 p refs
(Grant DA-ARO-49-092-65-671)
(Rept.-2; AD-629215) CFSTI: HC $3.00/MF $0.75

The report deals with studies of K and Cs ion effects on Na ion efflux and O_2 consumption in resting muscle cell; and the action of trypsin and phospholipase C in the presence of Cs or K Ringer's solution on resting membrane potential. Na efflux results are consistent with calculated differences in penetration rates of C and K ions. But O_2 consumption results are reversed from anticipated if considered a reflection of energy to drive the Na pump mechanism. Work has been done on membrane depolarization by various agents and their interaction and reversibility characteristics. Acetylcholine (ACh), ACh–Cs depolarizes membrane approaching a value of 55 mV. Or approximately the threshold action potential of membrane. This may be reversed by displacement by washing with K–Ringer. It is prevented by D–turbo-effect on Cs than K treated membrane. Tr does not alter capacity of ACh to evoke depolarization but alters its reversibility when Cs is substituted for K. A model receptor system and allosteric action mecanisms are discussed. Author (TAB)

N66-23979# George Washington Univ., Washington, D. C. Human Resources Research Office.
MEASURES OF ABILITY AND PROGRAMED INSTRUCTION PERFORMANCE
William H. Melching Dec. 1965 18 p refs
(Contract DA-44-188-ARO-2)
(TR-65-12; AD-629443) CFSTI: HC $1.60/MF $0.50

The results of several programed instruction studies were compared with regard to the relationship between measures of ability and measures of programed instruction performance. Although there were some exceptions, each ability measure tended to be substantially related to each measure of program-test performance. The contention that programed instruction eliminates achievement differences due to intellectual ability was not substantiated. Author

N66-23993# Washington Univ., Seattle.
A NOTE ON SOME ALTERNATIVE MODELS FOR RESPONSE BIAS CHANGES DURING FORCED-CHOICE DETECTION EXPERIMENTS
Don A. Ronken 1 Nov. 1965 13 p refs
(Contract Nonr-477(34))
(PLR-13N; AD-629677) CFSTI: HC $1.60/MF $0.50

Several variants of a learning model for forced-choice detection experiments may be produced by making various reasonable assumptions regarding which events are effective in producing response bias changes. Atkinson and Kinchla assumed the bias changed according to a single parameter stochastic learning mechanism, such changes occurring only when no signal was detected. An alternative formulation uses two learning parameters and postulates the bias changes on every trial, but at different rates, according to whether or not the signal is detected. This two-parameter bias model was

applied to the original data, and produced numerical estimates of the parameters which confirm the conjecture that the bias changes principally during non-detection trials. In addition, the parameter estimates indicate that the relative effectiveness of information feedback is determined by its relative frequency of occurrence, an interpretation which was not possible from the single-parameter model. Author

N66-24017# Naval Radiological Defense Lab., San Francisco, Calif.

X-RAY INDUCED GLOMERULOSCLEROSIS IN RATS: MODIFICATION OF LESION BY FOOD RESTRICTION, UNINEPHRECTOMY, AGE

Louis W. Wachtel, Leonard J. Cole, and Victor J. Rosen 11 Feb. 1966 20 p refs

(USNRDL-TR-977; AD-629512) CFSTI: HC $1.60/MF $0.50

The development of glomerulosclerosis was measured in the kidneys of rats under various conditions of irradiation and growth. Weanling rats whose kidneys were irradiated directly with 1,000 rad or 2,000 rad developed glomerulosclerotic lesions in 2 months; one-year old rats showed no evidence of lesions 2 months after irradiation with 2,000 rad. In the weanling rat the rapidity of development and severity of the glomerulosclerotic lesions were increased by growth or enlargement of the kidney subsequent to irradiation, and were slowed by growth retardation artificially produced through low-food intake. The induction of glomerulosclerosis by X-irradiation of the kidney is believed to be a latent result of damage to the kidney's vascular system, and that the effects of this damage are accentuated in the growing kidney.

Author (TAB)

N66-24046# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

PROBLEMS OF RADIATION SAFETY OF SPACE FLIGHTS. PHYSICAL AND BIOLOGICAL INVESTIGATIONS WITH HIGH-ENERGY PROTON

Yu. G. Nefedova, ed. 27 Dec. 1965 231 p refs Transl. into ENGLISH of the book "Problemy Radiatsionnoy Bezopasnosti Kosmicheskikh Poletov. Fizicheskiye i Biologicheskiye Issledovaniya s Protonami Bol'shikh Energiy" Moscow, Atomizdat., 1964 p 1–239

(FTD-MT-65-159; AD-629421) CFSTI: HC $22.70/MF $1.25

CONTENTS:

1. FEATURES OF THE RADIATION EFFECT IN SPACE FLIGHT CONDITIONS AND MEANS OF DEVELOPING PERMISSIBLE RADIATION LEVELS p 3–20 refs (See N66-24047 13-04)
2. RESEARCH IN DOSIMETRY AND SHIELDING ON THE OIYal SYNCHROCYCLOTRON p 21–50 refs (See N66-24048 13-22)
3. BIOLOGICAL ACTION OF PROTONS WITH AN ENERGY OF 510 MEV DURING MULTIPLE IRRADIATION p 51–93 refs (See N66-24049 13-04)
4. BIOLOGICAL ACTION OF PROTONS WITH AN ENERGY OF 510 MEV DURING SINGLE IRRADIATION p 94–129 refs (See N66-24050 13-04)
5. BIOLOGICAL ACTION OF PROTONS WITH AN ENERGY OF 126 MEV ON THE CORNEAL EPITHELIUM OF MICE p 130–139 refs (See N66-24051 13-04)
6. DETERMINATION OF THE BIOLOGICAL ACTION OF PROTONS WITH AN ENERGY OF 510 EV AND X-RAYS WITH AN ENERGY OF 180 KV ON HEREDITARY STRUCTURES p 140–145 refs (See N66-24052 13-04)
7. BIOLOGICAL ACTION OF PROTONS WITH AN ENERGY OF 130 MEV, X-RAYS WITH AN ENERGY OF 180 KV, AND Co^{60} GAMMA-RADIATION ON THE VESTIBULAR ANALYZER p 146–171 refs (See N66-24053 13-04)
8. BIOLOGICAL ACTION OF MULTIPLE X-IRRADIATION WITH AN ENERGY OF 180 KV COMPARED TO PROTON IRRADIATION IN DOSES AND TIME DISTRIBUTION p 172–181 (See N66-24054 13-04)
9. COMPARATIVE ANALYSIS OF THE BIOLOGICAL ACTION OF PROTON RADIATION WITH AN ENERGY OF 510 MEV p 182–193 (See N66-24055 13-04)
10. PROPHYLAXIS AND TREATMENT OF RADIATION INJURIES CAUSED BY THE ACTION OF PROTONS p 194–220 refs (See N66-24056 13-04)

N66-24047# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

FEATURES OF THE RADIATION EFFECT IN SPACE FLIGHT CONDITIONS AND MEANS OF DEVELOPING PERMISSIBLE RADIATION LEVELS

In its Probl. of Radiation Safety of Space Flights. Phys. and Biol. Invest. with High-Energy Proton 27 Dec. 1965 p 3–20 refs (See N66-24046 13-04) CFSTI: HC $22.70/MF $1.25

The action of intense radiation fields from X-rays and γ-sources, as well as from charged high energy particles during manned space flight conditions were analyzed, and permissible radiation levels for the human body in planetary and circumferential space exploration were established. Dosage estimates were made by computations of the absorbed particle energy in an isolated gram of human tissue. Biological danger was estimated for primary and secondary cosmic radiation, penetrating radiation from solar flares, and electron and bremsstrahlung effects of the outer and inner radiation belts of the earth. Permissible dosages of 50 rem during spaceflights lasting from several days to one year, and of 25 to 30 rem per year for a flight lasting several years were found. Individual radiosensitivity of the human subjects should be considered in the selection of astronauts. G.G.

N66-24049# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

BIOLOGICAL ACTION OF PROTONS WITH AN ENERGY OF 510 MeV DURING MULTIPLE IRRADIATION

In its Probl. of Radiation Safety of Space Flights. Phys. and Biol. Invest. with High-Energy Proton 27 Dec. 1965 p 51–93 refs (See N66-24046 13-04) CFSTI: HC $22.70/MF $1.25

Physical conditions were created for irradiation of dogs and rats by high energy protons, tissue doses were computed, and analyses of the radiation composition in the animals was conducted. Biological action of high energy protons in fractional irradiation at energies of 510 Mev at doses of 250 to 650 rad for dogs, and at 100 to 1200 rad for rats showed progressive radiation sickness syndromes with the characteristic functional and morphological disturbances. Biological action of the protons was less expressed in the reaction of the peripheral blood and bone marrow as compared with γ- and X-radiation; however, in later periods serious changes in the blood picture appeared with full aplastic anemia and subsequent death of the animals. Animals irradiated on a faster schedule showed a more acute development of the radiation disease. Morphological examinations of animal cadavers established the typical hemorrhagic syndromes in all internal organs, especially in all sections of the brain. G.G.

N66-24050# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

BIOLOGICAL ACTION OF PROTONS WITH AN ENERGY OF 510 MeV DURING SINGLE IRRADIATION

In its Probl. of Radiation Safety of Space Flights. Phys. and Biol. Invest. with High-Energy Proton 27 Dec. 1965 p 94–129 refs (See N66-24046 13-04). CFSTI: HC $22.70/MF $1.25

Single irradiation experiments on dogs and rats exposed to proton energy of 510 Mev and different rad dosages, were reported. All dogs developed acute radiation sickness after a certain latent period, depending on the size of the dose. Developing pathomorphological changes were similar to acute radiation symptoms caused by X-rays of γ-rays; most characteristic were multiple hemorrhages in the subcutaneous cellular tissues of the trunk and neck, and also in the internal organs and tissues of the body. Radiation sickness developing in rats after proton irradiation with an energy of 510 Mev in doses up to 400 rad was mild and did not lead to exitus; a climax in radiation sickness symptoms was found from the 3rd through the 10th day after exposure, with hemorrhagic diathesis and reduction of the lymphoid apparatus of the spleen. Later, by the first 2 weeks after irradiation, regeneration of lymphocytes and partial restoration of the rat follicles were observed. G.G.

N66-24051# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

BIOLOGICAL ACTION OF PROTONS WITH AN ENERGY OF 126 MeV ON THE CORNEAL EPITHELIUM OF MICE

In its Probl. of Radiation Safety of Space Flights. Phys. and Biol. Invest. with High-Energy Proton 27 Dec. 1965 p 130–139 refs (See N66-24046 13-04) CFSTI: HC $22.70/MF $1.25

Physiological tissue regeneration in the corneal epithelium of mice, exposed to proton irradiation with an energy of 126 Mev, was studied to determine the relative biological effectiveness of radiation. Irradiation in doses of 200 rad and 500 rad caused inhibition of mitotic activity, a decrease of the quantity of cells and the appearance of pathological forms of mitosis. As the irradiation dosage increased, the degree of suppression of mitotic activity increased, and the intensity of the restoring processes dropped. Analyses of chromosomal aberration disappearances from the corneal epithelium of the irradiated animals led to the assumption that the RBE of high energy protons, as determined by the distant consequences of irradiation, can be higher than the RBE determined on the basis of early reactions. G.G.

N66-24052# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

DETERMINATION OF THE BIOLOGICAL ACTION OF PROTONS WITH AN ENERGY OF 510 eV AND X-RAYS WITH AN ENERGY OF 180 kV ON HEREDITARY STRUCTURES

In its Probl. of Radiation Safety of Space Flights. Phys. and Biol. Invest. with High-Energy Proton 27 Dec. 1965 p 140–145 refs (See N66-24046 13-04) CFSTI: HC $22.70/MF $1.25

The relative biological efficiency (RBE) of protons with an energy of 510 Mev, and of X-rays with an energy of 180 kv was studied by observing the frequency of appearance of dominant lethals in the irradiated sex cells of the hereditary structures in rats and dogs. It was found that the RBE coefficient of protons with an energy of 510 Mev, with respect to general action and with determination of the lethal and 50% dose of survival for 30 to 60 days, was about 0.7 for rats and about 1.0 for dogs. Small doses of protons were biologically more effective than corresponding doses of X-rays in rats; but an inverse relationship was observed with large doses of protons and X-rays. G.G.

N66-24053# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

BIOLOGICAL ACTION OF PROTONS WITH AN ENERGY OF 130 MeV, X-RAYS WITH AN ENERGY OF 180 KV, and Co^{60} GAMMA-RADIATION ON THE VESTIBULAR ANALYZER

In its Probl. of Radiation Safety of Space Flights. Phys. and Biol. Invest. with High-Energy Proton 27 Dec. 1965 p 146–171 refs (See N66-24046 13-04) CFSTI: HC $22.70/MF $1.25

Experimental data for the influence of ionizing radiation on the activity of the vestibular analyzer in labyrinthectomized dogs and rabbits were obtained after their exposure to high energy protons and gamma radiation. Corresponding numerical ratios were established between the radiation dose and the biological effect by observing the intensity and duration of caloric nystagmus. An increase in ionizing radiation dosage lowered the excitability of the animals' nervous systems. However, a single small dose of about 50 r to 100 r increased the excitability of their vestibular analyzer. G.G.

N66-24054# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

BIOLOGICAL ACTION OF MULTIPLEX-IRRADIATION WITH AN ENERGY OF 180 KV COMPARED TO PROTON IRRADIATION IN DOSES AND TIME DISTRIBUTION

In its Probl. of Radiation Safety of Space Flights. Phys. and Biol. Invest. with High-Energy Proton 27 Dec. 1965 p 172–181 (See N66-24046 13-04) CFSTI: HC $22.70/MF $1.25

Biological effects of radiation injuries caused by fractional multiple proton and X-ray exposures were studied by corresponding irradiations of dogs and rats with an energy of 180 kv. Multiple irradiation to a cumulative dose of 613 r to 667 r resulted in acute radiation sickness of the dogs with sharply expressed hemorrhagic syndromes. Rats developed a milder case of radiation sickness with death of some animals. At a cumulative dose of 1015 r, 22% of the rats died in two months and 60% at later periods. Blood changes were in both groups identical. G.G.

N66-24055# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

COMPARATIVE ANALYSIS OF THE BIOLOGICAL ACTION OF PROTON RADIATION WITH AN ENERGY OF 510 MeV

In its Probl. of Radiation Safety of Space Flights. Phys. and Biol. Inves. with High-Energy Proton 27 Dec. 1965 p 182–193 (See N66-24046 13-04) CFSTI: HC $22.70/MF $1.25

Clinical manifestations of radiation sickness in dogs, as a result of fractional exposure to protons (510 Mev) and to X-radiation (180 kv), developed in acute form with a sharply expressed hemorrhagic syndrome. At the same time, the average life duration of the dogs after fractional X-irradiation was longer than the average life duration after a single irradiation at the same dosage. The RBE coefficient of proton irradiation for both conditions was equal. Data obtained for fractional irradiation of rats showed a higher effective death rate for X-irradiation. The RBE coefficient of fractional proton irradiation was established as equal to 0.8. G.G.

N66-24056# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

PROPHYLAXIS AND TREATMENT OF RADIATION INJURIES CAUSED BY THE ACTION OF PROTONS

In its Probl. of Radiation Safety of Space Flights. Phys. and Biol. Invest. with High-Energy Proton 27 Dec. 1965 p 194–220 refs (See N66-24046 13-04) CFSTI: HC $22.70/MF $1.25

Prophylaxis and therapy of radiation injuries caused by exposure of mice and dogs to gamma and X-ray irradiation were studied by the comparative effectiveness of radioprotective chemical preparations, curative means, and therapeutic methods. The most pronounced defensive action was obtained by the combined action of 5-hydroxytryptamine and a combination of cystamine and amygdalin; especially 5-hydroxytryptamine showed good anti-hemorrhagic action in proton irradiation. An effective protective–curative complex consisting of animal acclimatization to a low oxygen atmosphere and oral administration of cystamine and amygdalin one hour before irradiation showed definite curative properties against proton damage; however, this protective complex did not prevent the development of a plastic anemia in the animals at a later date. G.G.

N66-24060# Aerojet-General Corp., Dayton, Ohio.
PROCEEDINGS OF THE CONFERENCE ON ATMOSPHERIC CONTAMINATION IN CONFINED SPACES
Wright-Patterson AFB, Ohio, AMRL [1965] 324 p refs Conf. held at Dayton, Ohio, 30 Mar.–1 Apr. 1965 Sponsored by AMRL
(Contract AF 33(657)-11305)
(AMRL-TR-65-230; AD-629622) CFSTI: HC $7.00/MF $1.50

Conference papers on continuous inhalation exposure techniques, statistical methods of evaluation and interpretation of exposure data, minimum criteria for continuous exposure studies, and toxicological qualification of space cabin materials are presented. For individual titles see N66-24061–N66-24080.

N66-24061# Aerospace Medical Div. Aeromedical Research Lab. (6570th), Wright-Patterson AFB, Ohio.
CHAMBER EQUIPMENT DESIGN CONSIDERATIONS FOR ALTITUDE EXPOSURES
Anthony A. Thomas *In* Aerojet-Gen. Corp. Proc. of the Conf. on Atmospheric Contamination in Confined Spaces [1965] p 9–17 (See N66-24060 13-05) CFSTI: HC $7.00/MF $1.50

Dome shaped altitude exposure chambers for performing inhalation studies are described that operate under controlled conditions of oxygen–CO_2 concentration, oxygen flow rate, temperature, contaminant flow, and absolute pressure and dew point; their altitude capability goes up to 28,000 feet. The flow diagram for this animal exposure chamber encompasses a gas-off oven for heating space cabin materials to their working temperatures, and an additional life support system to maintain the small animal exposure chamber within the 5 psia, 100% oxygen atmospheric parameter. G.G.

N66-24062# Aerojet-General Corp., Dayton, Ohio. Toxic Hazards Research Unit.
CONTAMINANT GENERATION METHODS AND TECHNIQUES
J. D. Mac Ewen *In its* Proc. of the Conf. on Atmospheric Contamination in Confined Spaces [1965] p 18–26 refs (See N66-24060 13-05) CFSTI: HC $7.00/MF $1.50

Contaminant generating techniques are described that introduce into experimental environmental chambers toxic compounds or materials at desired consistency, and gas-off products of material mixtures in the presence of 100% oxygen under pressure, metering, and flow control. A theoretical approach for establishing nominal atmospheric concentrations in an animal exposure chamber uses the formula ppm = mg/l × 24. 450 × mol. wt to calculate the amount of gas or other material to be delivered and mixed with the chamber's air stream. Non-volatile liquid agents are introduced into the chamber by atomizers or fog generating devices; aerosols can be generated from suspensions or salt solutions. G.G.

N66-24063# Aerojet-General Corp., Dayton, Ohio. Toxic Hazards Research Unit.
ANALYTICAL CONTROL OF CONTAMINANT CONCENTRATION IN EXPOSURE CHAMBERS
Edmond H. Vernot *In its* Proc. of the Conf. on Atmospheric Contamination in Confined Spaces [1965] p 27–33 refs (See N66-24060 13-05) CFSTI: HC $7.00/MF $1.50

Spectrophotometric and gas chromatographic techniques for controlling low concentrations of contaminants in exposure chambers were described. Air samples were obtained by pumping the gas at low pressure into a glass sampling tube whose volume was measured exactly. Nitrogen dioxide analysis was then performed according to the Saltzman method; carbon tetrachloride and chlorobromethane were quantitatively analyzed by gas chromatographic methods. G.G.

N66-24064# Bionetics Research Labs., Inc., Falls Church, Va.
THE NEED FOR CRITICAL EVALUATION OF CHOICE OF ANIMAL SPECIES FOR CONTINUOUS INHALATION EXPOSURE EXPERIMENTS
J. R. M. Innes *In* Aerojet-Gen. Corp. Proc. of the Conf. on Atmospheric Contamination in Confined Spaces [1965] p 34–45 refs (See N66-24060 13-05) CFSTI: HC $7.00/MF $1.50

The need to maintain disease free laboratory animals for continuous inhalation experiments involves constant supervision and awareness of disorders that can develop spontaneously. Incidence of chronic murine pneumonia and infectious catarrhs in experimental rats leads to a high infection rate. Monkeys are very susceptible to acute pulmonary diseases caused by a variety of pathogenic bacteria; tuberculosis especially is a problem of great magnitude in monkey colonies. It is recommended that imported *Macaca mulatta* should not be used for chronic studies as they have some degree of mite infestations and lung lesions. Studies proved that lung mites from monkeys can survive in the lungs of abnormal hosts for some time, and that cross-infestation between monkeys and other mammals (even man) may be possible. G.G.

N66-24065# Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.
CLINICAL LABORATORY METHODS
Mildred K. Pinkerton *In* Aerojet-Gen. Corp. Proc. of the Conf. on Atmospheric Contamination in Confined Spaces [1965] p 46–57 refs (See N66-24060 13-05) CFSTI: HC $7.00/MF $1.50

Some clinical laboratory methods and terms for use in continuous inhalation exposure studies are discussed that involve colorimetric analysis and measurements by spectrophotometry. Criteria for selected procedures were economy, ease of performance, speed of obtaining results, reproducibility or precision, sample size required, inherent laboratory error, and general acceptance of the specific principle involved. The more common biochemical serum components along with the general principles of the recommended methods are listed in a table; also shown are the experimentally proven stabilities of several serum components. G.G.

N66-24066# School of Aerospace Medicine, Brooks AFB, Tex. Psychological Chemistry Section.
EXPERIMENTAL BIOLOGICAL AND BIOCHEMICAL PARAMETERS
Johnie L. Reeves *In* Aerojet-Gen. Corp. Proc. of the Conf. on Atmospheric Contamination in Confined Spaces [1965] p 58–65 refs (See N66-24060 13-05) CFSTI: HC $7.00/MF $1.50

Regularly scheduled and frequent examinations of laboratory animals used in environmental toxicology experiments

are advocated. Animal observations should include the general behavior patterns; unusual pupillary size and reactions; conditions of the conjunctivae, of the skin, and of the oral mucous membranes; and studies of the breathing rate, the character of breathing, and chest sounds. Most of the recommended laboratory procedures relate to specimens of venous blood. G.G.

N66-24067# Dow Chemical Co., Midland, Mich. Biochemical Research Lab.

GROSS AND HISTOPATHOLOGICAL EVALUATION

Howard C. Spencer *In* Aerojet-Gen. Corp. Proc. of the Conf. on Atmospheric Contamination in Confined Spaces [1965] p 66–73 (See N66-24060 13-05) CFSTI: HC $7.00/MF $1.50

A systematic dissection during autopsies of laboratory animals exposed to environmental toxic atmospheres should describe observed gross lesions by their location, severity, extent, and size. In addition to the respiratory system, the criteria of growth—liver and kidney weight, and liver and kidney histopathology—should be extended to include lung weight, lung gross, and lung histopathology. Continuous inhalation exposure studies should also include recordings of the heart and testes, spleen, and adrenal weight and pathology; bone marrow investigations should be included if indicated by peripheral hematology. G.G.

N66-24068# Ohio State Univ., Columbus. Dept. of Mathematics.

STATISTICAL METHODS IN TOXICOLOGICAL RESEARCH

J. S. Rustagi *In* Aerojet-Gen. Corp. Proc. of the Conf. on Atmospheric Contamination in Confined Spaces [1965] p 77–85 refs (See N66-24060 13-05) CFSTI: HC $7.00/MF $1.50

Discussed are those statistical techniques which are especially relevant to the effects of contaminated atmospheres on animals in confined spaces. Comparison of two populations establishes the effect of certain environmental conditions on physiological changes in blood and tissues of various animals by denoting blood variables as $X_1, X_2, \ldots, X_k$ where the components of X are stochastically dependent and have multivariate distribution, and where k constitutes any blood variable like number of red blood cells, amount of sodium, etc. Effects of exposure to chemicals, gases, and other environmental factors can thus be statistically evaluated by comparing the control groups with the treated groups. G.G.

N66-24069# Aerospace Medical Div. Aeromedical Research Lab. (6571st), Holloman AFB, N. Mex.

PERFORMANCE MEASURES DURING EXPOSURE TO TOXIC ENVIRONMENTS

Herbert H. Reynolds *In* Aerojet-Gen. Corp. Proc. of the Conf. on Atmospheric Contamination in Confined Spaces [1965] p 86–97 refs (See N66-24060 13-05) CFSTI: HC $7.00/MF $1.50

Psychological work in toxicological environmental animal research pertains to experiment design considerations, choice of species and sample size, selection of performance tasks and the training of subjects, and data acquisition and evaluation. Performance schedules should encompass the following criteria: (1) vision and hearing stimuli; (2) responses involving those nervous system areas that are potentially critical to toxicological–physiological studies; (3) elastic performance schedules to ensure manageable training problems; and (4) the capability of the animal. An example monkey performance schedule for a 30-day test in a 100 percent O_2, 5 psi environment is presented, and the stimulus-response panel for this schedule is shown. G.G.

N66-24070# Aerojet-General Corp., Dayton, Ohio. Toxic Hazards Research Unit.

PRELIMINARY RESULTS OF TOXICITY STUDIES IN 5 PSIA 100% OXYGEN ENVIRONMENT

James M. Mc Nerney *In its* Proc. of the Conf. on Atmospheric Contamination in Confined Spaces [1965] p 98–123 (See N66-24060 13-05) CFSTI: HC $7.00/MF $1.50

A 90-day exposure study of mice, rats, beagles, and monkeys to a 5 psia and 100% oxygen environment produced the following results: (1) Wistar rats were sensitive to altitude conditions early in the exposure and showed a 15% mortality within 14 days; Sprague-Dawley rats proved more resistant; and (2) a possible association of increased serum glutaminic pyruvic transaminase levels in beagles with length of exposure was found. No significant increases in the toxic responses of animals to inhaled atmospheric contaminants (carbon tetrachloride, nitrogen dioxide, and ozone) were observed under conditions of 5 psia and 100% oxygen. Based upon mortality rates, a definite reduction in toxic response to pulmonary irritants was found at a reduced pressure 100% oxygen atmosphere when compared with a similar atmosphere at ambient pressure. G.G.

N66-24071# Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.

REVIEW OF AIR FORCE DATA FROM LONG TERM CONTINUOUS EXPOSURE AT AMBIENT PRESSURE

Kenneth C. Back *In* Aerojet-Gen. Corp. Proc. of the Conf. on Atmospheric Contamination in Confined Spaces [1965] p 124–133 (See N66-24060 13-05) CFSTI: HC $7.00/MF $1.50

Work on environmental toxicology of space cabin atmospheres over the past 5 years centered on the development of toxicity criteria for various animals, and its standardization in the so-called Industrial Threshold Limit Values (TLT). Reported are experiments on monkeys, rats, and mice to test these established tolerable contaminant levels in various contaminated atmospheres over differing lengths of times. It was shown, that carbon tetrachloride, while not causing death at 25 ppm, did produce serious clinical and microscopical liver changes in all exposed animals; phenol had no toxic effects at the 5 ppm level. A summary of observed animal mortality rates in continuous toxicity exposure to hydrazine, UDMH, nitrogen dioxide, and decaborane established hydrazine as the most toxic agent for rats and mice; decaborane was less species effective; and UDMH was better tolerated than either hydrazine or decaborane by all animals. Monkeys showed great tolerance towards nitrogen dioxide. G.G.

N66-24072# Naval Medical Research Inst., Bethesda, Md. Navy Toxicology Unit.

REVIEW OF AMBIENT PRESSURE ANIMAL EXPOSURE DATA FROM SELECTED NAVY COMPOUNDS

Jac Siegel *In* Aerojet-Gen. Corp. Proc. of the Conf. on Atmospheric Contamination in Confined Spaces [1965] p 134–147 (See N66-24060 13-05) CFSTI: HC $7.00/MF $1.50

Reviewed are parametric studies, evaluated materials, and the animal species mortality rates obtained during a five year study on chronic and acute inhalation toxicity of guinea pigs, rats, rabbits, monkeys, and dogs. Emphasis was placed on results from atmospheres containing oxyfants and hydrocarbons. Accumulative data based on 30-, 60-, and 90-day exposures to carbon tetrachloride reached a 20% mortality in guinea pigs after 90 days; atmospheric ozone concentrations increased guinea pig mortality also, and a nitrogen dioxide containing atmosphere showed mortality effects for both, guinea pigs and rats. G.G.

N66-24073# Public Health Service, Cincinnati, Ohio.
LONG TERM INHALATION EXPOSURE EXPERIENCE WITH REFERENCE TO AIR POLLUTION
F. Gordon Heuter *In* Aerojet-Gen. Corp. Proc. of the Conf. on Atmospheric Contamination in Confined Spaces [1965] p 148–165 (See N66-24060 13-05) CFSTI: HC $7.00/MF $1.50

Examined were the long term exposure effects on dogs, guinea pigs, and rats to an atmosphere polluted by raw oil exhausts and also by irradiated oil exhausts which simulated the photochemistry that occurs during sunlight and causes a reaction of the exhaust mixture. In general, there were no statistically significant effects of auto exhaust atmospheres with respect to mortality, growth, immunology, blood gas analyses, or oxygen consumption; but significant effects in terms of susceptibility to infection with increasing age, and spontaneous activity were found. Mouse fertility decreased markedly and fewer litters were born. Bone lead analyses on sacrificed mice showed increased bone lead accumulation with increased auto exhaust concentrations in the atmosphere. G.G.

N66-24074# National Academy of Sciences—National Research Council, Washington, D. C.
PROBLEMS IN THE INTERPRETATION AND EXTRAPOLATION OF ANIMAL DATA TO MAN
Harry W. Hays *In* Aerojet-Gen. Corp. Proc. of the Conf. on Atmospheric Contamination in Confined Spaces [1965] p 166–173 (See N66-24060 13-05) CFSTI: HC $7.00/MF $1.50

A brief review of the evolution of animal experimentation and on predictability of toxicity in man is given, and some of the problems are outlined that make interpretation and extrapolation of animal data to man difficult. Extension of animal test data to man rests foremost on the careful selection of species for application to a special research problem; more studies in metabolism are needed to make data interpretation meaningful. In addition, preplanning and regular periods of assessment together with better analytical methods, especially in inhalation work, were considered of importance to improve predictability. G.G.

N66-24075# Public Health Service, Washington, D. C. Abatement Branch.
THE FEDERAL CLEAN AIR ACT FOR DOWN-TO-EARTH POLLUTION CONTROL IN UNCONFINED SPACES
Pope A. Lawrence *In* Aerojet-Gen. Corp. Proc. of the Conf. on Atmospheric Contamination in Confined Spaces [1965] p 219–225 (See N66-24060 13-05) CFSTI: HC $7.00/MF $1.50

Highlights of the current federal air pollution control programs were presented and some works under the provisions of the Clean Air Act are outlined. Developments of air quality criteria by establishing standards for source emissions and ambient air are concentrated on the oxides of sulfur and photochemical oxidants such as ozone, but other pollutants are scheduled for intensive study. G.G.

N66-24076# National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.
PROBLEMS OF SPACECRAFT MATERIALS SELECTION AND TOXICOLOGICAL EVALUATION
Elliott S. Harris *In* Aerojet-Gen. Corp. Proc. of the Conf. on Atmospheric Contamination in Confined Spaces [1965] p 231–241 refs (See N66-24060 13-05) CFSTI: HC $7.00/MF $1.50

Components, materials, and techniques used in various enclosed life support systems which may decrease or add to the contamination problem, are discussed. The general areas involving storing and processing of waste products are defined for the Gemini capsule, the Apollo Command Module, and the Lunar Excursion Module; their individual acceptability criteria for the off-gassing products from non-metallic materials are presented. The following factors developed for minimizing the risk of a toxic response from the spacecraft's crew: (1) off-gassing substances should be low molecular weight additives and unpolymerized materials with relatively high vapor pressures; (2) anticipated leak rates of approximately 0.2 lb/hr at 70°F and 5 psia pressure should be provided; (3) removal and absorption of atmospheric contaminants by activated charcoal and LiOH in the environmental control system; (4) isolation or removal of as many components as possible from the crew compartment; and (5) off-gassing of the space vehicle with all systems operational during preflight decompression tests, thus reducing the quantity of material available for atmospheric contamination. G.G.

N66-24077# Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.
LIFE SUPPORT EQUIPMENT AND ITS CONTRIBUTION TO CONTAMINANT GENERATION AND REMOVAL
Robert W. Roundy *In* Aerojet-Gen. Corp. Proc. of the Conf. on Atmospheric Contamination in Confined Spaces [1965] p 242–247 refs (See N66-24060 13-05) CFSTI: HC $7.00/MF $1.50

Systems for storing and processing of waste products in a closed atmosphere require antifoaming agents, ion exchange resins, various oxidizing agents, etc., which may contribute to atmospheric contamination. Maintenance of a habitable atmospheres involves the continuous removal of gas from the enclosed environment, the processing of this gas, and the return of the usable portion of the gas for breathing purposes. This process can be accomplished either by cyclic absorption of water vapor and carbon dioxide on molecular sieves, silica gel, activated charcoal, etc., or by a reversible absorption system employing carbon dioxide decomposition techniques to obtain carbon and oxygen. Both processes involve some leakage that must be taken into consideration by the life support designer. G.G.

N66-24078# School of Aerospace Medicine, Brooks AFB, Tex. Chemistry Support Section.
SAMPLING AND ANALYSIS OF ATMOSPHERIC CONTAMINANTS
James P. Conkle *In* Aerojet-Gen. Corp. Proc. of the Conf. on Atmospheric Contamination in Confined Spaces [1965] p 248–267 refs (See N66-24060 13-05) CFSTI: HC $7.00/MF $1.50

Detection and quantitation of contaminants in closed ecological systems rests on techniques for obtaining samples with sufficient concentrations of contaminants to permit analysis. A multistage cryogenic trapping system was developed that passes the sample gas from which the contaminants are to be removed through cylinders maintained at three different temperatures of 0°C, −78°C, and −175°C. This cryogenic trap system partially separates compounds due to the three different operational temperatures in the three traps. Initial infrared examinations and subsequent gas chromatographic studies of the filtered samples, together with the total amount of gas processed by the trapping system and the quantity of the contaminant recovered in the traps, were then used to calculate the mg/m3 in the simulator atmosphere. G.G.

N66-24079# Monsanto Research Corp., Dayton, Ohio.
ANALYTICAL TECHNIQUES FOR IDENTIFICATION OF GAS-OFF PRODUCTS FROM CABIN MATERIALS
John V. Pustinger *In* Aerojet-Gen. Corp. Proc. of the Conf. on Atmospheric Contamination in Confined Spaces [1965] p 276–295 (See N66-24060 13-05) CFSTI: HC $7.00/MF $1.50
(Contract AF 33(615)-1779)

Several different sampling techniques and analytical methods were used to define gas-off products from a variety of space craft materials, and to estimate the concentration and gas-off rates of these potential contaminants of enclosed atmospheres. Candidate materials were placed for various lengths of times into ecological chambers and the chamber atmospheres were then studied by: (1) analyses of their carbon monoxide and methane content; (2) direct gas chromatography for gas-off products; (3) mass spectrometry of the condensed gas-off products; and (4) gas chromatographic fractionation with mass spectrometric or infrared identification of the collected fractions. Major yields in gas-off products were obtained from candidate paints and coatings; lesser amounts of atmospheric contaminants were released from oxidating, hydrolytic, and sublimating processes. G.G.

N66-24080# Naval Research Lab., Washington, D. C.
ATMOSPHERIC CONTAMINATION IN SEALAB I
Raymond A. Saunders *In* Aerojet-Gen. Corp. Proc. of the Conf. on Atmospheric Contamination in Confined Spaces [1965] p 296–305 (See N66-24060 13-05) CFSTI: HC $7.00/MF $1.50

Contaminants in the atmosphere of an underwater living quarter were sampled by activated charcoal container and recovered from the sampler by slow heating in a vacuum desorption apparatus containing a large bore tube and cryogenic traps for retaining the desorbate. Chromatographic analysis of the desorbate mixture recovered from the charcoal showed some thirty-four peaks. Mass spectral analyses of the fractionated material indicated a total number of approximately one hundred contaminants identified as saturated and unsaturated aliphatic hydrocarbons and aromatic hydrocarbons. The major portion of the desorbate consisted of compounds above C_7 in molecular weight. G.G.

N66-24105# California Univ., Los Angeles. Biotechnology Lab.
UPPER EXTREMITY PROSTHETICS RESEARCH. HUMAN TRACKING. SENSORY MOTOR CONTROL. MYOELECTRIC CONTROL Progress Report, 15 Oct. 1965–15 Jan. 1966
John Lyman 15 Jan. 1966 22 p ref
(Contracts VA-V1005P-9779; N123(60530)32857A; AF 33 (615)-1969; Grant VRA-RD-1201M-64)
(Rept.-66-9; AD-628964) CFSTI: HC $1.00/MF $0.50

Biotechnology research summaries are presented. Upper extremity prosthetics includes investigations of pneumatic and electric limbs, exploration of minor surgical methods for implanting and harnessing transducers, and evaluation of design criteria for externally powered prostheses. Sensory motor control research covers experimental investigations of functional muscle isolation by training, and development of an external logic system for prosthetic motion control. In myoelectric control systems research, investigations of unidimensional EMG control to cyclic and step inputs are reported, and EMG tracking equipment is described. The performance of human operators with tracking systems is discussed. D.T.

N66-24114*# Washington State Univ., Pullmann. Primate Research Center.
ULTRASOUND AND PHAKOMETRY MEASUREMENTS OF THE PRIMATE EYE Technical Report, Aug. 1965
Francis A. Young, George A. Leary, and Donald N. Farrer Holloman AFB, N. Mex., 6571st Aeromed. Res. Lab., Feb. 1966 33 p refs
(NASA Order R-25; Grant PHS-NB-05459-01)
(NASA-CR-74013; ARL-TR-66-5) CFSTI: HC $2.00/MF $0.50 CSCL 06C

Results obtained on 160 eyes of 53 male and 40 female chimpanzees ranging in age from 2 to 15 years, using ultrasonography and photographic ophthalmophakometry to measure anterior chamber depth, lens thickness, and axial length, are compared with the results obtained on 140 human eyes of a comparable sex grouping using the same methods. The intercorrelations between methods are not quite as high on the chimpanzees as on the humans, but the correlations between the measures of axial length and the vertical ocular refraction are virtually identical for the two groups. Either ultrasound or photographic ophthalmophakometry may be used successfully on primates and will yield results which compare favorably with those obtained on humans, but ultrasound is the method of choice since it does not require as much time to make the measurement or to calculate the result as does phakometry. Further, it does not require the rigid degree of control over the animal's behavior that phakometry requires and its flexibility allows measurement in situations in which it would be impossible to obtain phakometry measurements. Thus for both human and animal work, ultrasound is generally superior to phakometry. Author

N66-24123*# Naval School of Aviation Medicine, Pensacola, Fla.
ENERGY DISSIPATION CHARACTERISTICS IN TISSUE FOR IONIZING RADIATION IN SPACE Progress Report No. 13, 1 Dec. 1965–28 Feb. 1966
Hermann J. Schaefer [1966] 3 p
(NASA Order R-75)
(NASA-CR-71812) CFSTI: HC $1.00/MF $0.50 CSCL 06R

When exposed to radiation from solar particle beams under conditions of light shielding, it was considered that the radiation dose in the skin will be the limiting factor as far as permissible exposure is concerned. Studies were undertaken to analyze the pertinent dose distributions both on the rad and rem dose level. The relative biological effectiveness factors of the alpha and medium heavy component of flare beams was also of major interest. Three representative spectra were selected with rigidity gradients corresponding to P_o values of 50, 125, and 300 Mv in the exponential formula $J=J_o \exp(-P/P_o)$ for the integral spectrum. The data derived from these studies showed that the contributions of the alpha and medium heavy component to total dose grow substantially as P_o grows. The rad doses in the skin for a normalized proton dose rate of 100 rads/hr are listed and the magnification of dose fractions, from the heavy components, if rad doses are converted to rem doses is discussed. H.S.W.

N66-24124# Hawaii Univ., Honolulu. Pacific Biomedical Research Center.
A COMPARISON, UNDER ARCTIC SURVIVAL CONDITIONS, OF A PEMMICAN-TYPE MEAT BAR WITH AN ISOCALORIC RATION OF SUCROSE PLUS ELECTROLYTES Progress Report, 1 Jan.–1 Jun. 1964
Terence A. Rogers, James A. Setliff, Alan C. Buck, and Milton Matter, Jr. Ft. Wainwright, Alaska, Arctic Aeromed. Lab., Nov. 1965 16 p refs
(Contract AF 41(609)-1918)
(AAL-TR-65-11; AD-628898) CFSTI: HC $1.60/MF $0.50

The basis of current arctic survival ration is pemmican or a meat bar composed of powdered lean meat mixed with fat. The present experiment compares, under survival conditions, metabolic changes in men fasting completely, men receiving sucrose and electrolyte supplements, and men receiving the meat bar. Eighteen men divided into three groups of six men each, ate a standard diet of USAF IF No. 10 rations in barracks

for two days, then underwent a seven-day simulated survival situation. Isocaloric intake of pemmican at this level did not appear to have any great advantage over simple starvation, whereas sucrose with a sodium salt supplement prevented or ameliorated some of the symptoms of starvation. It was concluded that although the caloric density and high protein content of pemmican are advantageous to fully-fed men, pemmican is inferior to sucrose plus sodium salts for severely limited calorie regime. Author (TAB)

N66-24126# Joint Publications Research Service, Washington, D. C.
BIONICS
M. G. Gaaze-Rapoport and V. E. Yakobi, ed. 20 Apr. 1966 633 p refs Transl. into ENGLISH of the book "Bionika" Moscow, Navka Publ. House, 1965 p 1-474
(JPRS-35125; TT-66-31562) CFSTI: $9.10

Pattern recognition and learning machines, simulation of neuron networks, and capabilities of various biological systems are considered in terms of applicability to the design of engineering devices and systems. For individual titles see N66-24127-N66-24200.

N66-24127# Joint Publications Research Service, Washington, D. C.
BIONICS AND ITS SIGNIFICANCE IN TECHNOLOGICAL DEVELOPMENT
A. I. Berg *In its* Bionics 20 Apr. 1966 p 1-9 refs (See N66-24126 13-04) CFSTI: $9.10

The far-reaching implications are discussed for bionics, which is defined as the study applying biological laws to technology to increase the range and quality of technical systems, machines, and instruments. Areas in bionics, related to obtaining, transmitting, and processing information, which are considered include: (1) development of receptors and analyzers for biological systems which have low energy requirements, are highly sensitive and reliable, and are small in size; (2) investigation of neurons for use in all the elements of information handling; (3) consideration of encoding procedures for information transmission within biological systems at various levels; (4) investigation of nerve networks and centers as complex hierarchal systems for handling information; (5) determination of source and nature of pattern recognition processes; construction of control systems related to the adaptation of living organisms to changes in environment; and investigation of means to obtain a high degree of reliability of biological systems. An overview of many of these research areas is presented. M.W.R.

N66-24128# Joint Publications Research Service, Washington, D. C.
PATTERN RECOGNITION IN BIONICS
J. M. Glushkov *In its* Bionics 20 Apr. 1966 p 10-15 refs (See N66-24126 13-04) CFSTI: $9.10

Pattern recognition is considered as one of the most important and complex problems in the area of bionics, and the construction of self-teaching machines is discussed in very general terms. Automatic recognition of patterns is considered closely related to the problem of neuron network simulation; and it is stated that accuracy of such simulation should increase proportionately to progress made in the manufacturing of radioelectronic equipment. In terms of automation theory, the idealized nerve networks are those which are so-called discrete and logical and which can be represented, at least in part, by some continuous set of numerical values. Another possibility discussed is the simple realization of a nomogeneous global mechanism for controlling the average level of activity of the neuron. Limitations to a three-layer perceptron theory of learning are considered, and present trends in perception research are outlined. M.W.R.

N66-24129# Joint Publications Research Service, Washington, D. C.
THE SELECTION OF SIGNS USED IN RECOGNITION
G. Sh. Rozenshteyn *In its* Bionics 20 Apr. 1966 p 16-22 refs (See N66-24126 13-04) CFSTI: $9.10

Reading of letters in pattern recognition problems is approached in terms of the selection of signs for use in the recognition process. It is assumed that a set of operators exists, and that each of the patterns shown may be converted into another pattern by using one of the operators. Although no procedures are as yet available for the determination of such a set, studies are underway which will shed light on the construction of variables which are invariant with respect to the operators. In particular, research in various areas of geometry and topology may be useful in determining patterns in recognition of visual images, and such approaches may be particularly useful in constructing the necessary primary signs. A problem is solved which deals with letters on a random grid line for which certain signs are introduced; and a pattern recognition procedure is proposed which satisfies the six properties which are considered inherent to a shape recognition model and which may be of use in the study of recognition algorithms for animals with primitive visual systems. M.W.R.

N66-24130# Joint Publications Research Service, Washington, D. C.
SOME PROBLEMS IN THE STATISTICAL THEORY OF PATTERN RECOGNITION
A. G. Frantsuz *In its* Bionics 20 Apr. 1966 p 23-35 refs (See N66-24126 13-04) CFSTI: $9.10

A structural diagram is presented for the biological and technical analysis of a pattern recognition dichotomy, that is, the recognition of two classes of patterns. Essentially, this means that two objects from a training series are presented to the system; their descriptions in the form of a set of primary signs are stored in the memory. For the selection of secondary signs, hypotheses which are stored in a library are developed during the recognition solution. It is pointed out that this procedure may not result in the required signs. Statistical interpretation of the results is considered to take place in accord with certain decision rules which are developed during the training process. It is further pointed out that there are at present no means for synthesizing secondary signs from primary ones, although some satisfactory conversions have been developed from intuitive relationships. An object comparison method is considered, and two algorithms which employ statistical probability are investigated for sign selection. Also considered are some assumptions about the normality of the distributions and the equality of the covariance matrices for both classes of objects. M.W.R.

N66-24131# Joint Publications Research Service, Washington, D. C.
NEW DATA ON THE PROCESS OF VISUAL RECOGNITION
V. D. Glezer and A. A. Nevskaya *In its* Bionics 20 Apr. 1966 p 36-45 (See N66-24126 13-04) CFSTI: $9.10

Details are given for a diagram which explains the recognition of shapes by a visual system. The procedure differs from the ordinary tachistoscopic presentation of the image in that erasure of the image switches the visual system to a new problem and interrupts the process of recognition of the first image. It was found that after prolonged training, with sets of four and eight variously-oriented lines, a linear dependency was not observed between amount of information obtained

and length of presentation. The concept of carrying capacity is considered inapplicable in such a case, which is regarded as the recognition of a finished pattern by comparison with a stored standard. When recognizing complex figures, there is a direct proportionality between amount of information and time of presentation. It is concluded that certain complex signs are developed by the visual system, but very little about their organization is known. There is evidence, however, that these complex signs are invariant with regard to such changes as magnitude of the image; and, on the basis of some experiments with fish, it is assumed that a complex sign results from the transformation of the image as an entirety. Tests on three humans who were well-trained in the recognition of a specified set of geometric figures indicate that recognition usually takes place via a series of sequential selections with respect to complex signs. M.W.R.

N66-24132# Joint Publications Research Service, Washington, D. C.

CLINICAL PICTURE OF DISTURBANCES IN VISUAL PERCEPTION AND PATTERN RECOGNITION

I. M. Tonkonogiy and I. I. Tsukkerman *In its* Bionics 20 Apr. 1966 p 46–51 refs (See N66-24126 13-04) CFSTI: $9.10

Problems in bionics require new methods for studying the clinical picture of disturbances in visual perception. These methods which are related to theoretical information representations may be of value in clinical diagnosis and rehabilitation therapy for visual impairment. An example of a brain-injured patient is given to show how it is possible to partially compensate for visual disturbance by retention of operative memory of other human systems. Additional study of visual damage will help to determine the volume and internal structure of its operative memory, the delay time for various memory links, and the peculiarities of transferring frequently encountered memory links into long-term memory by statistical encoding during training. Filtration of noises in the analyzer system is discussed, and the use of crossed out figures in pattern recognition is mentioned. M.W.R.

N66-24135# Joint Publications Research Service, Washington, D. C.

THE ROLE OF STABILITY OF THE SPECTRUM IN OBJECTIVE DISCRIMINATION OF VOICE

M. F. Derkach *In its* Bionics 20 Apr. 1966 p 67–74 refs (See N66-24126 13-04) CFSTI: $9.10

An investigation was undertaken to determine frequency ranges in the voice spectrum that can be used to produce an objective classification of sounds according to phonemes, which are considered to be a collection of sounds which are identical with respect to interpretation. For each of the phonemes, determination was made of the average value of the normalized intensity, the intensity dispersion, and the standard error in the average intensity. Data presented on a phoneme consisting of four voiceless consonants and another of three vowels indicate differences in average intensity within each group in a very limited spectral range. The entire group of voiceless glottals differ from the group of vowels in the range of 5700 to 12,000 cycles. It appears that highest values of the stability coefficient correspond to the spectral channels which differentiate between groups of phonemes. M.W.R.

N66-24136# Joint Publications Research Service, Washington, D. C.

FUNCTIONAL ORGANIZATION OF THE NERVOUS SYSTEM AND PATTERN RECOGNITION

R. M. Meshcherskiy *In its* Bionics 20 Apr. 1966 p 75–86 refs (See N66-24126 13-04) CFSTI: $9.10

Feedback in the projection system of a visual analyzer is investigated, and an attempt is made to determine the role of feedback in the pattern recognition process. It is found that an increase in the excitability of the visual cortex produces an increase in amplitude or softening of the response of the geniculate lateral (GL) to a flash of light. A lowering of GL responses accompanies the lowering of visual cortex activity. It is concluded that the projection zone controls the passage of the afferent discharge through the GL by means of both positive and negative feedback. A model is developed to reproduce the interrelationships between the visual cortex and the GL during the course of pattern recognition; circuits in the model determine the associative signs of the pattern and permit comparison of a programed pattern with a combination of excited photodiodes. Data obtained permit a critical approach to the representation of a purely stochastic structure of the central nervous system; and logical networks are presented which simulate certain laws of the functional organization of the so-called visual analyzer. M.W.R.

N66-24137# Joint Publications Research Service, Washington, D. C.

THE DEPENDENCY OF THE SIZE OF THE HUMAN MEMORY ON THE AMOUNT OF INFORMATION

P. B. Nevel'skiy *In its* Bionics 20 Apr. 1966 p 87–92 refs (See N66-24126 13-04) CFSTI: $9.10

Experiments are conducted which indicate that the volume of the human memory is dependent upon the number of symbols remembered as well as the total amount of information. The size of direct memory is considered to reflect the capacity for retaining one time perception, whereas the size of long-term memory reflects both the capacity for retention and the accumulation of information. It is concluded that there are two means of recoding information in the memory process: (1) a decrease in the amount of information in the remembered symbols by limiting the symbol alphabet and not changing the symbols or (2) a decrease in the number of symbols by use of a new alphabet and replacement of symbols by a small number of new symbols. M.W.R.

N66-24138# Joint Publications Research Service, Washington, D. C.

THE STRUCTURE OF THE PROCESS OF MEMORIZING AND INFORMATION PROCESSING BY A HUMAN

P. I. Zinchenko, V. Ya. Lyaudis, and P. B. Nevel'skiy *In its* Bionics 20 Apr. 1966 p 93–97 refs (See N66-24126 13-04) CFSTI: $9.10

Two methods of arbitrary logical remembering, described as processes of indirect memory in its most developed form, are compared. In one method the dependence of memory on the amount of information was investigated; in the other memory was related to amount of information, objective characteristics of the material, and procedures for remembering. Properties of mnemonic conversion of material were studied by the analysis of memory related to unrelated words, subject classification, text material, and number series. A general discussion follows, and the dynamics of mnemonic activity are considered. It is concluded that the amount of information and the length of series determine the size of the memory itself and also in relation to the variation in mnemonic activity of the individual. M.W.R.

N66-24139# Joint Publications Research Service, Washington, D. C.

ADAPTIVE BIOELECTRONIC SYSTEMS OF PERCEPTION, TRAINING AND CONTROL

P. V. Simonov and F. Ye. Temnikov *In its* Bionics 20 Apr. 1966 p 98–106 refs (See N66-24126 13-04) CFSTI: $9.10

Adaptive bioelectronic systems are considered in terms of automatic control of the state of the operator, and mention is made of the use of such adaptive systems in the development of narcosis and automata. Diagrams are shown of an autophotosimulator programed for suppression of alpha rhythm of an electroencephalogram, a bioelectronic attention system, and a device where a change of sequences is automatically controlled by the cutanogalvanic reactions of the observer. Applications for adaptive bioelectronic systems are considered to be in the areas of: (1) perception in man and animals with respect to sensory patterns and generalized signals where emotions come into play; (2) creation of attention-keeping devices which can be used under the influence of such distracting factors as fatigue, drowsiness, or poor habits; (3) control of situations in which the operator lets his emotions take hold; (4) optimization of learning processes to create machines which will take emotional effects into consideration; and (5) development of automatic recognition and tracking systems. M.W.R.

N66-24140# Joint Publications Research Service, Washington, D. C.

CORRELATION OF ADAPTIVE SYSTEMS OF VARYING DEGREES OF SPECIFICITY IN THE PROCESS OF PERCEPTION

A. Ye. Liberman *In its* Bionics 20 Apr. 1966 p 107–112 refs (See N66-24126 13-04) CFSTI: $9.10

An investigation is made of the adaptive-orienting interrelationship in the visual analyzer, with observations made of reactions of the pupil to various situations. An excitant, such as sound or smell, was used for the orienting reactions stimulus. When the pupils were dilated in response to these stimuli, the brightness of the visual image on the retina was increased and the level of sensitivity was, therefore, decreased. Absolute values for the orienting reflex of the pupil, calculated for responses made by 25 people without visual and sensitivity difficulties, turned out to be conjugate to the level of the photoadaptive tonus of the pupil. The relative value manifested in quite a broad range of artificial illumination. It is found that under the influence of a new nonvisual stimulus, image brightness on the retina is increased on the average of 20%. This reaction to new stimuli is considered a measure of the gradient of the orienting excitation which is relatively independent of the variations in the background stimulation. The interrelationships of the various adaptive systems which control perception are considered applicable to problems in pattern recognition, self-teaching machines, and the general fields of bionics and cybernetics. M.W.R.

N66-24141# Joint Publications Research Service, Washington, D. C.

PECULIARITIES OF CELLULAR AND SUBCELLULAR ORGANIZATION OF THE ORGANS OF SENSE IN THE LIGHT OF PROBLEMS IN BIONICS

Ya. A. Vinnikov *In its* Bionics 20 Apr. 1966 p 113–124 refs (See N66-24126 13-04) CFSTI: $9.10

A general discussion is presented on the peculiarities of cellular, subcellular, and molecular organization of the sense organs which enable the perception of various types of sensory stimuli. The sense organs of various animals are considered in terms of problems which may arise in the field of bionics. From the bionics point of view it is the uniqueness of organization at the various levels of the sensory receptors that is of interest. M.W.R.

N66-24142# Joint Publications Research Service, Washington, D. C.

FREQUENCY CHARACTERISTICS AND ABSOLUTE THRESHOLD IN THE SENSITIVITY OF THE PHOTORECEPTORS OF CERTAIN INSECTS

N. V. Antakova, A. V. Kalinina, L. K. Len'shina, A. N. Malakhov, T. A. Russina et al *In its* Bionics 20 Apr. 1966 p 125–133 refs (See N66-24126 13-04) CFSTI: $9.10

Frequency characteristics and thresholds of vision for 73 species of insects were investigated by an electrophysical procedure which obtained an electroretinogram of the compound eye by use of tungsten microelectrodes. Frequency characteristics were obtained in a range of 0.1 to 100 cycles, and threshold sensitivity was determined in absolute units of the intensity of the light falling on the eye. For most of the insects it was found that the basic range of perception extends from 0.1 to 20 cycles per second; for humans the figure of 0.5 to 12 cycles is given. It is shown that insects which are basically diurnal, such as hymenoptera, dragonflies, diptera, and daylight butterflies, exhibit the least sensitivity to light. Nocturnal butterflies, on the otherhand, display considerably more sensitivity. M.W.R.

N66-24143# Joint Publications Research Service, Washington, D. C.

THE USE OF THE PROPERTIES OF VISION TO INCREASE THE SHARPNESS OF THE STEREOVISION OF A STEREOTELEVISION

S. M. Vilenskay, L. V. Ovchinnikov, and T. M. Tsykunova *In its* Bionics 20 Apr. 1966 p 134–138 refs (See N66-24126 13-04) CFSTI: $9.10

Influence of image outlining on stereo effect is studied in connection with the development of stereotelevision apparatus which can be remotely controlled. Outlining, which is used to increase resistance to noise, is found to increase the keenness of the stereovision of 10 examinees. Experiments were covered with both black and black–white outlining of the contrast image of the rods, with contrasts between 0.5 and 0.8; as well as with blackout lining of low contrast images in the order of 0.1. Greatest increase in keenness was obtained when outlining the low contrast images and also with frequent outlining of the contrast images. Certain corrections can be made for shifts between left and right channels and errors in transposition. M.W.R.

N66-24144# Joint Publications Research Service, Washington, D. C.

ON THE ROLE OF AFFERENTATION IN THE CONTROL OF THE MOTOR FUNCTIONS OF THE EYES

A. R. Shakhnovick *In its* Bionics 20 Apr. 1966 p 139–146 (See N66-24126 13-04) CFSTI: $9.10

An immovable blind spot, referred to as an artificial scotoma, was created in the center of field of vision in order to determine the role of afferentation in controlling the motor functions of the eyes. Six healthy humans were permitted to see surroundings in the peripheral field of vision but central vision was cut off by use of specially-constructed black damper. When the eyes were rotated an illusion of displacement of the scotoma resulted, an artificial dizziness occurred. One of the mechanisms for the dizziness is assumed to be the discord in the signals from the retina and from the centers of the voluntary eye movement. This is considered to be evidence of some mechanism in the center which controls eye movement. An apparatus using a mirror image was used to show that there is also a peripheral mechanism which controls voluntary movement of the eyes. It is concluded that eye motion is controlled by the complex interactions of afferentations such as the visual, vestibular, proprioreceptors of the eyes, and the neck muscles. M.W.R.

N66-24145# Joint Publications Research Service, Washington, D. C.

ON CONTROL OF THE TRACKING MOTIONS OF THE EYES

A. R. Shakhnovich, M. V. Dzhanelidze, and A. A. Inauri *In its* Bionics 20 Apr. 1966 p 147–153 (See N66-24126 13-04) CFSTI: $9.10

Basic characteristics and the extrapolation mechanism of tracking motions of the eyes are analyzed, and electroculograms are included for various motions. It is shown that the tracking motion of the eyes permits the holding of an image of a moving object relatively motionless on the retina, and this stabilization can be realized for quite an extended time without corrective jumps. It is the presence of the extrapolation mechanism which permits this. Investigations indicate that the tracking motions differ from all other types of eye movements and are more complex in organization. The control of tracking motions is considered to involve the highest level of oculomotor innervation, and because of the control complexity involved the present study is considered of a preliminary nature. M.W.R.

N66-24146# Joint Publications Research Service, Washington, D. C.

THE PHYSIOLOGY OF THE CHEMORECEPTOR SENSILLAE OF INSECTS

Yu. A. Yelizarov *In its* Bionics 20 Apr. 1966 p 154–165 refs (See N66-24126 13-04) CFSTI: $9.10

Specificity of the response of individual receptor sensilla on the labellae of the proboscis of the Stomoxys calcitrans fly was determined in a wide range of concentrations of various stimulants, namely sodium chloride, glucose, and insect repellents. In large concentration, NaCl excites one sensory cell, while glucose another type; the repellents act exclusively on the receptors specific to NaCl. The simplest chemoreceptor sensillae have two specific receptors: both S- and L-receptors, and the possibility of a system for showing this is proposed. M.W.R.

N66-24147# Joint Publications Research Service, Washington, D. C.

STRUCTURAL ORGANIZATION OF THE OLFACTORY RECEPTOR OF FISH

N. V. Bodrova *In its* Bionics 20 Apr. 1966 p 166–173 refs (See N66-24126 13-04) CFSTI: $9.10

Experimental-morphological investigations were conducted of the olfactory organs in fish by impregnation of the cerebrum with methyl blue to gain information about the behavior of the organism and, apparently, with the possibility of simulating the olfactory organ itself. Although three forms of receptor neurons, (thread, rod, and cone shaped) are present in all fish, there appear to be differences in the total number of neurons, their individual shapes and structures, and in the nature of their localization in the epithelium. Details are presented for studies relating to the olfactory bulb of the perch, bream, and burbot. M.W.R.

N66-24152# Joint Publications Research Service, Washington, D. C.

CONSTRUCTION OF AN AUTOMATIC CONTROL SYSTEM FOR THE CIRCULATORY SYSTEM

V. M. Khayutin *In its* Bionics 20 Apr. 1966 p 210–220 refs (See N66-24126 13-04) CFSTI: $9.10

The purposes of control and the general functioning of the circulatory system are considered in a paper dealing with the construction of an automatic control system for the circulatory system. The principles related to the control of blood circulation may be of interest to bionics because engineers engaged in the construction of various devices often encounter problems of optimal distribution of limited supplies of power and material. The discussion is divided into three stages, dealing with operating hyperemia, compensatory construction of the vessels, and optimization. According to the hypothesis presented, it is the third stage in control that optimizes the operation of the entire cardiovascular system. M.W.R.

N66-24153# Joint Publications Research Service, Washington, D. C.

THE POLYFERMENT SYSTEM OF A CELL AS THE OBJECT OF BIONIC INVESTIGATIONS

Ye. Ye. Sel'kov *In its* Bionics 20 Apr. 1966 p 221–228 refs (See N66-24126 13-04) CFSTI: $9.10

Any self-organizing system is considered to have the following properties: (1) variable parameters which determine the condition of conducting signals in the system, (2) feedback varying these parameters toward lightening the signals being sent, and (3) a memory. An attempt is made to show that such properties are inherent not only in complex polyferment systems, but also in simple fermentative reaction systems and even in these individual reactions. Each signal passing through the reaction leaves behind it a trace in the form of a deviation in the concentration of the free ferment from the steady-state value, and the reaction is remembered. The described mechanism for remembering the reaction is called a dynamic memory with an exponential law of forgetfulness. It is concluded that the solution of such cellular organization problems may have applicability in the expedient solution of economic problems. M.W.R.

N66-24154# Joint Publications Research Service, Washington, D. C.

ON THE SIMULATION OF THE HUMAN MIND

N. M. Amosov, E. T. Golovan, S. Ya. Zaslavskiy, and V. S. Starinets *In its* Bionics 20 Apr. 1966 p 229–236 refs (See N66-24126 13-04) CFSTI: $9.10

The introduction of emotions into the operation of "intelligence" machines is considered, and specific cases discussed include: (1) assignment of emotions to elements of the input word and (2) development of an emotional state before the input word is introduced into the model. These are attempts to simulate thought functions in definite situations, and overcome some of the difficulties in heuristic approaches which do not account for peculiarities in the emotional sphere and the organization of the human memory. The model which is presented consists of seven conditionally separate blocks, namely: (1) input, (2) interaction, (3) emotions, (4) response, (5) analysis, (6) short-term memory, and (7) long-term memory. M.W.R.

N66-24155# Joint Publications Research Service, Washington, D. C.

ON THE CONCEPT OF RESONANCE PROCESSES IN THE MECHANISM OF PHOTORECEPTION

I. S. Brit *In its* Bionics 20 Apr. 1966 p 237–239 (See N66-24126 13-04) CFSTI: $9.10

Mechanisms of similar resonance processes in photoreceptors are discussed briefly in general terms. Inasmuch as the bulk of an elementary disc in a receptor is practically closed, it is considered according to the classical electromagnetic theory as dielectric. It is assumed that the elementary disc from the outer section or the disc of the mitochondria may be excited by predetermined wavelengths as in an oscillatory system with distributed constants. The outer sections and nuclei of their receptors react as resonators not to the visual spectrum but to infrared radiation. The basic resonance

frequencies of a large number of mitochondria contained in the inner section, however, correspond to the visible spectrum. There is still some question as to whether the bundle of fibrils located between the outer and inner segments of the receptor is a nonlinear element of a system, such as a mixer, frequency factor, or a modulator. M.W.R.

N66-24156# Joint Publications Research Service, Washington, D. C.

SOME PROBLEMS IN AERODYNAMICS AND HYDRODYNAMICS OF BIRDS AND ANIMALS

S. Ye. Kleynenberg *In its* Bionics 20 Apr. 1966 p 240–244 refs (See N66-24126 13-04) CFSTI: $9.10

Various observations relating to the flight of birds and the movement of mammals are mentioned in relation to possible applicability to bionics and the consequent development of usable and reliable devices. Observations of some unusual feats are noted with regard to aerodynamics and hydrodynamics. M.W.R.

N66-24157# Joint Publications Research Service, Washington, D. C.

INVESTIGATIONS OF THE FUNCTIONAL MORPHOLOGY OF FISH

Yu. G. Aleyev *In its* Bionics 20 Apr. 1966 p 245–251 refs (See N66-24126 13-04) CFSTI: $9.10

More than 200 species of fish, ecologically and morphologically quite different, were studied to compare their outer structures, accommodations relating to camouflaging, and the hydrostatics of the organisms. For the latter specific weight and buoyancy of the fish and their individual organs were determined. While details of the results are not presented, it is concluded that the devices relating to motion are represented by three large complexes which are concerned with: (1) neutralization of the effect of gravity, (2) forward motion, and (3) control of all motion. Development of propelling organs and other external structures is considered from an evolutionary point of view, that is, in the direction of increasing speed and adaptability. M.W.R.

N66-24158# Joint Publications Research Service, Washington, D. C.

LIVING MODELS OF AUTONOMIC FLOATING STRUCTURES IN THE OCEAN

A. I. Savilov *In its* Bionics 20 Apr. 1966 p 252–262 refs (See N66-24126 13-04) CFSTI: $9.10

Structural properties of the bodies of two coelenterates, velella and physalia, are observed because they use the force and direction of the prevailing winds to accelerate their movement in the ocean. Both forms have well developed organs which remain above the water and act as sails; the pneumatophore of the physalia is a large thin-walled vesicle filled with air and may be compared to the hull of a sailing sloop. A bundle of especially long main dactylozoids may be compared with a floating anchor thrown into the water from the stern of the sloop, and similar analogies can be drawn for other parts of the physalia. The velella, on the other hand, is compared to a raft which is equipped with keel and sail. It is considered that information about such organisms may be of use in engineering and technology investigations, and it is suggested that specific applications may be for the development of models of automatic weather monitoring stations which can remain in the ocean for long periods of time. M.W.R.

N66-24159# Joint Publications Research Service, Washington, D. C.

HYDRODYNAMIC ASPECTS OF STUDYING THE MOVEMENT OF AQUATIC ANIMALS

S. V. Pershin *In its* Bionics 20 Apr. 1966 p 263–273 refs (See N66-24126 13-04) CFSTI: $9.10

Structural characteristics and movements are investigated for mackerel-type fish, dolphins and whales, various cephalopods, and other aquatic animals; and the hydrodynamic aspects of the motion are summarized. In contrast to the way man-made sea vehicles travel, all natural submarine inhabitants have their motors and propellers in one mechanism to facilitate effective output of energy. This motion is always nonstationary and cyclical, but varies with the species; and various means are used to decrease the hydrodynamic resistance of the water and to control laminarization of the so-called boundary layer. Findings such as these are considered to have applicability in the construction of biohydrodynamic experimental devices and systems. M.W.R.

N66-24160# Joint Publications Research Service, Washington, D. C.

CHARACTERISTICS OF THERMAL CONTROL IN AN AQUATIC ENVIRONMENT (USING MAMMALS AS AN EXAMPLE)

V. M. Bel'kovich *In its* Bionics 20 Apr. 1966 p 274–279 refs (See N66-24126 13-04) CFSTI: $9.10

Various aspects of heat control in aquatic mammals are considered in terms of applications to technical problems, including (1) long-term storage of an interstitial air layer, (2) use of temperature gradient in heat exchangers, (3) staged and pulsating passage of the heat carrier in a heat exchanger, and (4) construction of light autonomic diving suits and submarines with soft hull coverings. It is pointed out that thermal insulation of land animals is usually accomplished by hair coverings; semiaquatic animals leave only the extremeties, tail, and certain part of the head uncovered; and since there are greater numbers of blood vessels in these parts, the thermal insulation is thereby accounted for. With the increase in length of time the species spends in the water, the thermal insulation seems to shift from the surface to the integument itself. For mammals which live in water constantly, the hair covering disappears almost completely, the outer layer of the skin increases in thickness, and there is more fatty layer. M.W.R.

N66-24161# Joint Publications Research Service, Washington, D. C.

SOME ASPECTS OF THE PROBLEM OF DEEP-SEA AUTONOMIC DIVING OF MAN IN THE LIGHT OF INVESTIGATIONS IN THE BIOLOGY OF DIVING MAMMALS

A. V. Yablokov *In its* Bionics 20 Apr. 1966 p 280–288 refs (See N66-24126 13-04) CFSTI: $9.10

Various characteristics of diving mammals are noted, and an attempt is made to relate these findings to applications of deep sea diving by humans. Essential basic areas for work involved during autonomic diving by man are discussed, and the simulation of structures and functions of cetaceans is considered. Both the biochemical aspects and the effects of pressure are investigated. M.W.R.

N66-24162# Joint Publications Research Service, Washington, D. C.

ACCOMMODATIONS IN THE PLUMAGE OF BIRDS FOR STREAMLINING AIR CURRENTS

T. L. Borodulina *In its* Bionics 20 Apr. 1966 p 289–296 refs (See N66-24126 13-04) CFSTI: $9.10

While the speeds required for aircraft flight are considerably greater than those of birds, the accommodations in the plumage of birds for streamlining air currents is discussed in terms of applicability to bionics and technological synthesis. Following an investigation of various feathers, it is concluded that the filament feathers on the body and wings of birds probably contain a receptor function and should be studied further for possible use in the simulation of engineering systems. M.W.R.

N66-24163# Joint Publications Research Service, Washington, D. C.

PROCEDURES FOR THE INVESTIGATION OF THE FLIGHT OF BIRDS TO DISCOVER THE PHYSICAL LAWS OF FLIGHT USING FLAPPING WINGS

N. V. Kokshayskiy *In its* Bionics 20 Apr. 1966 p 297–307 refs (See N66-24126 13-04) CFSTI: $9.10

The use of flapping wings by birds in flight is considered to offer the possibility of discovering new physical laws relating to flight and aerodynamics. Yet, flight is regarded as a part of the complex biological system which must be interrelated to other vital activities in order to obtain results which might be of use in the development of engineering systems. Energy expended by birds and other physiological indices are discussed, and the simulation of models of biological materials and systems is mentioned. M.W.R.

N66-24164# Joint Publications Research Service, Washington, D. C.

ORIENTATION AND NAVIGATION IN THE ANIMAL WORLD

B. P. Manteufel, N. P. Naumov, and V. E. Yakobi *In its* Bionics 20 Apr. 1966 p 308–315 refs (See N66-24126 13-04) CFSTI: $9.10

Various levels of spatial orientation in animals are investigated in terms of bionic applications, particularly as applied to the development of self-orienting and self-directing man-made systems. The simulation of receptor systems is considered of particular interest for both types of systems, and various sensory organs of animals are discussed. The location phenomenon in bats is reported, and the ultrasonic impulses of bats in flight is mentioned. It is noted that a bat may detect a wire as narrow as 0.175 mm in cross section. So-called echo-location is noted for birds in caves and other environments, as is the low frequency electromagnetic vibrations in fish. Migration in birds is discussed in general terms. M.W.R.

N66-24166# Joint Publications Research Service, Washington, D. C.

SOME RESULTS FROM REMOTE OBSERVATIONS OF THE BEHAVIOR OF MIGRATING FISH

A. G. Poddubnyy *In its* Bionics 20 Apr. 1966 p 323–332 refs (See N66-24126 13-04) CFSTI: $9.10

Return of fish to their original environment, following natural migratory movements or man-made displacements, is investigated; and it is found that a majority of fish move with the direction of the magnetic meridian. This occurs more frequently in situations where there are more homogeneous hydrophysical indices. Temperature, electrical conductivity, and depth as possible orientation factors are considered interrelated; and the speed of movement appears to be seasonal and related to time of day. Study of the navigational accommodations of fish is concluded to be of great value for the simulation of navigational engineering systems. M.W.R.

N66-24167# Joint Publications Research Service, Washington, D. C.

THE LATERAL LINE OF FISH AS A DEVICE FOR PERCEPTION OF THE ELECTRICAL FIELD

N. V. Bodrova and B. V. Krayukhin *In its* Bionics 20 Apr. 1966 p 333–340 refs (See N66-24126 13-04) CFSTI: $9.10

To determine the role of receptor in the surface of the body of fish to perceive electrical currents, the fish were anesthetized with novacaine to exclude the sensory nerves in their terminal apparatuses. It was found that carp and bullheads so anesthetized decreased their sensitivity by between 25 and 50%. It is concluded that the nerve endings of the body surface are stimulated by the current, and that fish with more nerve endings in their skin were more sensitive. Receptors in the lateral nerve of bream and pike were innervated for additional experiments, which lowered sensitivity to an electrical current, although thresholds were different for the two kinds of fish. It is suggested that researchers in bionics might turn their attention to the lateral line of fish as a complex and sensitive device which can perceive electrical and magnetic fields. M.W.R.

N66-24168# Joint Publications Research Service, Washington, D. C.

ON THE PROBLEM OF SOUND GENERATION AND DIRECTIVITY OF SOUNDS IN DOLPHINS

Ye. V. Romanenko, A. G. Tomilin, and B. A. Artemenko *In its* Bionics 20 Apr. 1966 p 341–346 refs (See N66-24126 13-04) CFSTI: $9.10

An experiment was undertaken to determine the role of the head of the white barrel dolphin as a concentrator of sound vibrations in the formation of a radiation pattern. A ceramic barium titanate sphere was mounted in the head of a dead dolphin in the area where the sound bags are located. When the dolphin's head, with emitter and receiver implanted, was submerged in water, it was discovered that a circular pattern of frequencies resulted, and that the radiation pattern became noticeably narrower when the frequencies went from low to high. At 30 kc, the pattern was approximately 90°, at 180 kc, it was 17°. Other studies with dolphins are mentioned. M.W.R.

N66-24169# Joint Publications Research Service, Washington, D. C.

SOME MATERIAL ON INTERPRETATION OF INFORMATION BY LIVING SYSTEMS

G. F. Plekhanov *In its* Bionics 20 Apr. 1966 p 347–352 refs (See N66-24126 13-04) CFSTI: $9.10

On the basis of a study in which examinees developed a conditioned response to change in voltage of an electromagnetic field of high frequency, and from some supporting evidence in the literature, it is concluded that information perceived by man is transmitted by signals of specific intensity and range. Further the specific receptors have force and range thresholds. Man can interpret information transmitted by subthreshold signals; nonspecific receptors, that is any cells, can perceive this subthreshold information; and while this information is transmitted, stored, and processed in the central nervous system, the procedure is not conscientiously recognized by man. In other words, direct stimuli cause a conditioned reflex and certain behavior, but subthreshold stimulation may evidence itself in the variation of certain physiological functions. Reference is made to some experiments with ants. M.W.R.

N66-24170# Joint Publications Research Service, Washington, D. C.

A MAGNETIC FIELD AS A STIMULUS

Yu. A. Kholodov *In its* Bionics 20 Apr. 1966 p 353–366 refs (See N66-24126 13-04) CFSTI: $9.10

Fish, amphibians, birds, and mammals were studied for their orientation to a magnetic field created by a constant cobalt magnet and an electromagnet through which a direct current was passed; in a few experiments, on fish and frogs, a 50-cycle alternating magnetic field was used. Although voltages varied between one and 1000 oersteds, the majority were between 100 and 300 oersteds. In most of the experiments, the magnetic field affected the physiological processes. In general, the magnetic field appears to be a weak stimulus; even in cases where a conditioned reflex was developed to the magnetic field, it was much weaker than reflexes to light or sound. The magnetic field is characterized as having a predominantly inhibiting influence on the central nervous system of vertebrates. Under magnetic field effect, it was found that EEG changed while pulse activity of the neurons remained almost unchanged. It is proposed that the glial cells of the brain are responsible for such results. M.W.R.

N66-24171# Joint Publications Research Service, Washington, D. C.

THE MECHANISM OF SHARPENING THE FREQUENCY SELECTION OF THE HEARING ORGAN

A. P. Molchanov and V. K. Labutin *In its* Bionics 20 Apr. 1966 p 367–376 refs (See N66-24126 13-04) CFSTI: $9.10

A three-channel system to explain the sharpening selectivity of the ear, based on the Licklider and Huggins hypothesis, may insure an increase in the actual selectivity of a model despite the existence of nonlinear elements. Detectors with a good deal of inertia were used to avoid the suppression of a weak signal by a stronger one. Some types of envelope detectors may not be particularly good in cases where there are signal disturbances in the three channel system. A detailed schematic and a block diagram of the three-channel model for sharpening frequency are shown. Each of the three amplifiers in the model has one oscillatory circuit, at the output of which there is a diode detector. Trimmers set the resonance frequencies for each channel, and variable resistors regulate the amplification. To decrease the output resistance of the model circuit, the final cascade is assembled as a follower made of pentodes with high curvature. M.W.R.

N66-24172# Joint Publications Research Service, Washington, D. C.

ON THE ELECTROMAGNETIC HYPOTHESIS OF BIOLOGICAL COMMUNICATION

A. N. Malakhov, A. S. Maksimov, and Yu. Ya. Nefedov *In its* Bionics 20 Apr. 1966 p 377–381 refs (See N66-24126 13-04) CFSTI: $9.10

A review of some experimental studies indicates that the spectrum of bioelectric activity of animals is continuous and drops with an increase in frequency of exposure. It is concluded that this continuity is evidence of the stochastic, noise nature biopotentials; the decrease at high frequencies is considered to indicate that the basic energy of the bioelectric activity resembles ultrasonic frequencies. Investigations further reveal that there are electromagnetic (EM) emissions from certain muscles of the frog, and evidence is presented for a forearm muscle. It is stated, however, that because these emissions are so minute they cannot serve as carriers of information in biocommunications, at least not in frequency ranges up to 150 kc. High frequency emission of a resonance nature may have some possibility for the use of EM emission as the basis for biocommunication. M.W.R.

N66-24173# Joint Publications Research Service, Washington, D. C.

BIOLOGICAL INDICATION OF AN SHF ELECTROMAGNETIC FIELD

A. N. Malakhov, I. V. Romanov, Yu. V. Smirnov, M. Yu. Ul'yanov *In its* Bionics 20 Apr. 1966 p 382–386 refs (See N66-24126 13-04) CFSTI: $9.10

Plerocercoids, fish, and mice are found to have the ability to indicate the existence of super-high frequency (SHF) fields. Plerocercoids subjected to both UHF and SHF irradiation do not survive as long as do those organisms in the control group; however, there are differences in survival rates for various frequencies. A conditioned reflex procedure was then used to determine whether the SHF electromagnetic field can serve as an information carrier for an animal, and experiments with fish and mice indicate that this is possible. The length of time required to develop these conditioned responses in mice, as well as the instability of the reactions, the short time the stimuli are retained, and their rapid extinguishability are considered to be evidence of the low information value of SHF signals in the vital activity of these white mice. M.W.R.

N66-24174# Joint Publications Research Service, Washington, D. C.

ON THE BIOELECTROMAGNETIC FIELD

M. A. Khvedelidze, S. I. Dumbadze, and T. D. Surguladze *In its* Bionics 20 Apr. 1966 p 387–397 refs (See N66-24126 13-04) CFSTI: $9.10

Although numerous experiments were carried out, there was no confirmation obtained for a proposed bioelectromagnetic field of low frequency accompanying the excitation and contraction of the heart and other muscle in the frog. Analysis of an individual nerve fiber and the whole nerve indicates that the total magnetic flux around both the part and the whole approaches zero. It is concluded that the electromagnetic radiation (EMR) of a living system may be considered as one of the forms of conversion of energy at the molecular level during metabolism; and that this EMR quantum in a living system occurs which is considered a carrier of information and a control signal in the living self-organizing system. M.W.R.

N66-24175# Joint Publications Research Service, Washington, D. C.

BIOLUMINESCENCE AS A SOURCE OF INFORMATION ABOUT BIOLOGICAL PROCESSES

I. I. Gitel'zon, R. I. Chumakova, and A. M. Fish *In its* Bionics 20 Apr. 1966 p 398–408a refs (See N66-24126 13-04) CFSTI: $9.10

A bathyphotometer, with submerged and above water parts joined by a cable, was used to investigate (1) the relationship between bioluminescence in the sea and both underwater optics and the ecology of marine organisms and (2) bioluminescence as a source of information about biological processes. Bathyphotograms were classified with respect to amplitude, length, and shape; used to determine the level of constant light background and the amount the bioluminescent signals exceed it; and to calculate the concentration of light producing objects in the water. Measurements indicate that lighting at nighttime is significantly more intense than during the day; and this may be explained by the physiological diurnal rhythm of the luminescence effect and the vertical migration of the bioluminescence reducing organisms. M.W.R.

N66-24176# Joint Publications Research Service, Washington, D. C.

MORPHOLOGICAL AND FUNCTIONAL BASE OF ACOUSTICAL ORIENTATION IN LAND VERTEBRATES IN CONNECTION WITH PROBLEMS IN SIMULATION

N. P. Naumov, V. D. Il'ichev, G. N. Simkin, and B. D. Vasil'yev *In its* Bionics 20 Apr. 1966 p 409–422 refs (See N66-24126 13-04) CFSTI: $9.10

A literature survey relating to the simulation of acoustical orientation in land vertebrates reveals that there is inadequate zoological data in the following areas: (1) inventory of the basic species and their hearing systems; (2) objects that can be used for more profound simulation investigations; (3) criteria for hearing which will permit the accumulation of morphological, physiological, and ecological data; and (4) combined functional and morphological data for use in bionic applications. The peripheral parts of the ear are considered appropriate as criteria for aural sensitivity; and are of interest because they serve as frequency filters and they can selectively perceive sound. M.W.R.

N66-24177# Joint Publications Research Service, Washington, D. C.

ON THE ROLE OF ECHOLOCATION IN THE ANALYSIS OF SPACE BY BATS

E. Sh. Ayrapet'yants and A. I. Konstantinov *In its* Bionics 20 Apr. 1966 p 423–432 refs (See N66-24126 13-04) CFSTI: $9.10

In studies relating to the flight of bats, it is found that the echo location spatial orientation is realized by means of temporary communications or conditioned reflexes. Destruction of the eardrum membrane results in a temporary disappearance of the straight-line directional path of the bat; movement becomes random and finding food accidental. Rapid restoration of linear motion is restored within 30 to 40 cm of the feedbox, indicating that the eyes play a role after the destruction of the hearing apparatus. Yet, cutting off the vision in bats appears to play an insignificant role in the selection of the correct course to find the feeding box. It is assumed that in returning to the refuge, bats orient themselves either with respect to the magnetic forces of the Earth or some other means which is not known to man rather than by echoes. M.W.R.

N66-24178# Joint Publications Research Service, Washington, D. C.

ON THE ASTRONAVIGATIONAL ABILITY OF MIGRATORY BIRDS

E. V. Kumari *In its* Bionics 20 Apr. 1966 p 433–437 refs (See N66-24126 13-04) CFSTI: $9.10

The literature is reviewed for information relating to the navigational ability of migratory birds, with special attention given to the explanation of orientation which occurs during nighttime migration. The theory that migratory birds make use of the solar azimuth and the stellar sky in finding their course is considered plausible, and further interdisciplinary studies are recommended for its substantiation. M.W.R.

N66-24179# Joint Publications Research Service, Washington, D. C.

EXPERIMENTS IN NEAR ORIENTATION AND THE INDIVIDUAL BEHAVIOR OF BIRDS

K. N. Blagosklonov *In its* Bionics 20 Apr. 1966 p 438–443 refs (See N66-24126 13-04) CFSTI: $9.10

When homing characteristics were studied in several species of birds, it was found that sex played no noticeable role, although females generally returned to the nest somewhat faster than males. Speed of return was not influenced by the number of baby birds in the nest, and the maturity of the nesting birds was not a significant factor. In non-nesting young birds, however, only one of 14 returned to the nest from a distance of 14km. Birds kept in captivity for six hours did not return until nine or 10 hours later, while those encaged for only two hours returned home within three hours. Landscape orientation factors appear to play a role in homing, and there appear to be a great deal of individual differences between various birds in speed of solution as well as the method employed. Reasons given to account for some birds losing their orientation during the nesting period include: (1) orientation ability, just as migratory instinct, may be seasonal in nature; (2) orientation during homing may involve a different mechanism than orientation in migration; and (3) homing is accomplished alone, whereas migration is a group activity. M.W.R.

N66-24180# Joint Publications Research Service, Washington, D. C.

THE PROBABILITY MECHANISM OF ACQUIRING NAVIGATIONAL SKILLS IN BIRDS DURING MIGRATION

V. E. Yakobi *In its* Bionics 20 Apr. 1966 p 444–451 refs (See N66-24126 13-04) CFSTI: $9.10

Navigational skills of birds, found to be formed before migration, are considered related to near orientation and to post nest wanderings. During these post nest wanderings, birds fly in a direction where feeding, defense, and aerodynamic conditions improve; and flight is connected with displacement of the sun, prevailing wind reaction, and a generally favorable ecological direction. Discontinuity in the process of acquiring navigation experience during migration is supported by the fact that birds do not always take the exact same route to their wintering ground. M.W.R.

N66-24181# Joint Publications Research Service, Washington, D. C.

NAVIGATIONAL CAPABILITIES OF MIGRATORY BIRDS

Kh. A. Mikhel'son and Ya. A. Viksne *In its* Bionics 20 Apr. 1966 p 452–458 refs (See N66-24126 13-04) CFSTI: $9.10

Travel loops formed during migration of birds between nesting and wintering grounds are discussed for the case of the Muscicapa hypoleuca, whose flight is between various parts of the Soviet Union and the Mediterranean area of Spain and Northern Africa. It is noted that the return flight in the spring is by a shorter route than the winter migration. Mature males return to the same or almost the same nesting area as in previous years, whereas the young males do not exhibit this specificity. M.W.R.

N66-24182# Joint Publications Research Service, Washington, D. C.

RESULTS OF HOMING EXPERIMENTS WITH VARIEGATED FLYCATCHERS

Ye. K. Vilks *In its* Bionics 20 Apr. 1966 p 459–461 refs (See N66-24126 13-04) CFSTI: $9.10

When variegated flycatchers were moved from two to three kilometers from their nests, more than 50% did not return. The majority of those who returned required between 10 and 20 hours, and some of the females did not return for two or three days. There appeared to be no significant difference between those females hatching their eggs and those feeding fledglings. These experiments support the assumption that landscape markings have no decisive significance in the return of birds from relatively short distances. It is suggested

that these negative results with regard to homing may be explained by the fact that the bird may not realize that he is in a strange place because he is a relatively short distance from his nest as compared to where he goes during migration. It is also suggested some peculiarities in the navigational mechanism do not adapt themselves to short distance homing.
M.W.R.

N66-24183# Joint Publications Research Service, Washington, D. C.
ON THE LIMITS OF THE CAPACITY OF SMALL BIRDS FOR ORIENTATION
V. R. Dol'nik and V. A. Payevskiy *In its* Bionics 20 Apr. 1966 p 462–471 refs (See N66-24126 13-04) CFSTI: $9.10

Small birds are found to be capable of determining the coordinates of an area to a very limited extent in a study dealing with sparrows. It was also shown that young finches can measure the length of day to within 10 minutes, and the date for migration to within three days. While these time measurements with respect to fall migration are very accurate, it is concluded that the perfect navigation of birds during their natural migration is explainable not by accurate determination of the coordinates in space, but rather by choices made because of influencing conditions during the migration itself.
M.W.R.

N66-24184# Joint Publications Research Service, Washington, D. C.
THE FIRST RESULTS OF INVESTIGATIONS OF MIGRATING ORIENTATION IN SPARROWS BY THE ROUND CAGE METHOD
M. Ye. Shumakov *In its* Bionics 20 Apr. 1966 p 472–480 refs (See N66-24126 13-04) CFSTI: $9.10

The circular cage method is considered an excellent way to study the orientation of birds during migratory periods because of the directionalness orientation and the astro-orientation factors applicable to such a method. It is found that directionalness of activity of the birds in the circular cage has a well-expressed diurnal rhythm with a maximum in the morning hours for the daylight migrants and at night for the nocturnal migrants. Further, the nocturnal migrants orient themselves during the daylight hours when there is sun. Seasonal variations in the caged studies correspond to changes which occur under natural conditions. The use of astro-orientation factors in the nonmigration period was not detected for several species of birds. During the migration period, rotation of the cage appears to have no effect on the direction the birds fly. It was also found that most species of birds were not influenced noticeably by flocks of other birds flying by; and in the presence of astro-orientation factors, most birds maintained the direction which is characteristic of their own species.
M.W.R.

N66-24185# Joint Publications Research Service, Washington, D. C.
SOME COMMENTS ON THE PROBLEM OF ORIENTATION
N. P. Naumov and V. D. Il'ichev *In its* Bionics 20 Apr. 1966 p 481–483 refs (See N66-24126 13-04) CFSTI: $9.10

A general discussion of orientation in birds mentions the limited capability of birds who are alone, and it is suggested that birds with a large angle of flight cannot orient themselves well in space. Particular attention is given to differences in orientation due to individual variability in structure and characteristics as well as to differences in communities of birds.
M.W.R.

N66-24186# Joint Publications Research Service, Washington, D. C.
POSSIBLE INTERACTION OF THE MAGNETIC FIELD AND BIOLOGICAL OBJECTS
B. A. Neyman *In its* Bionics 20 Apr. 1966 p 484–485 refs (See N66-24126 13-04) CFSTI: $9.10

The interaction between biological objects and magnetic field is discussed briefly. Since life goes on despite changes in magnetic field of the Earth, it is suggested that conditioned reflexes in animals are in some way connected to these changes. Efforts to find a so-called physiological clock or organ to measure these changes have not be successful, however. The author suggests that living organisms have an inherent capability to feel changes in magnetic field and, therefore, for orientation.
M.W.R.

N66-24187# Joint Publications Research Service, Washington, D. C.
THE BIONIC ASPECTS OF THE MAN-MACHINE RELATIONSHIP
V. V. Parin *In its* Bionics 20 Apr. 1966 p 486–494 (See N66-24126 13-04) CFSTI: $9.10

Bionics, considered to be closely related to cybernetics, is discussed as a separate science which is concerned with problems related to the study of: (1) living information systems on the basis of the nervous system and neuron networks, (2) organs of sense and reception in various living specimens, (3) principles of orientation and navigation in living organisms, and (4) structural peculiarities of living organisms. Within this framework, the bionic aspects are discussed for man-machine systems, pattern recognition simulation, and bioenergetics. Special attention is given to a study on "skin" vision which is shown to exists in sighted school-age children and to the use of biological objects as power sources.
M.W.R.

N66-24188# Joint Publications Research Service, Washington, D. C.
A MODEL OF A HUMAN OPERATOR IN AN INPUT SYSTEM FOR A DIGITAL COMPUTER
V. T. Kulik *In its* Bionics 20 Apr. 1966 p 495–499 ref (See N66-24126 13-04) CFSTI: $9.10

A man–machine system, which employs a model for the human operator for input into a digital computer, was found to be satisfactory. The general diagram and equivalent mathematical model are given for the input system with an operator; and additional diagrams illustrate systems (1) of operational diagnostics, (2) for processing data from scientific experiments, and (3) of programed training. Characteristic errors of the operator are tabulated, and it is concluded that the proposed model can exclude random errors on the part of the operator when converting oscillograph recordings into digital form for inputs into the computer.
M.W.R.

N66-24189# Joint Publications Research Service, Washington, D. C.
THE INTERACTION OF AN ELECTRICAL CURRENT WITH THE BODY OF A MAN AS ONE OF THE RESOURCES OF BIOPHYSICAL INFORMATION
V. Ye. Manoylov *In its* Bionics 20 Apr. 1966 p 500–502 refs (See N66-24126 13-04) CFSTI: $9.10

Body traumata from exposure to low voltages are considered caused by an attention factor and the location on the body of the current-carrying part rather than as a result of fibrillation of the heart muscle. During the investigation of the interaction of the human body and an electrical current, usually between four and eight volts, the presence of body zones of increased electrical conductivity were discovered coincident with zones of lowered electrical stability and increased sensitivity to electrical current. It is suggested that these zones result from a phenomenon similar to innercellular breakdown.

Experimental investigations in electrical resistance and threshold values of stimulating currents have shown that the numerical values of these parameters depend upon the proportion of oxygen in the air. M.W.R.

N66-24190# Joint Publications Research Service, Washington, D. C.

SOME EXAMPLES OF AUTOMATIC CONTROL FROM THE HEMODYNAMICS OF THE BRAIN AND CALCIUM METABOLISM IN THE BONES OF THE CRANIUM

M. B. Kopylov *In its* Bionics 20 Apr. 1966 p 503–506 refs (See N66-24126 13-04) CFSTI: $9.10

Three examples of circulation in the brain are described as examples of automatic self-control in a living organism: (1) local thinning of the internal bone membrane in the parietal bone close to the longitudinal commissure; (2) paradoxical forward deflection of the veins in the brain; and (3) direction of blood of equal pressure into the symmetrical hemispheres of the brain by two pairs of carotid and vertebral arteries. Another example of automatic self-regulation which is discussed is the dynamics of the calcium content in the cranium due to changes in intercranial pressure. For the latter the example given deals with changes in rigidity and shape of the bones of the skull during hydrocephalia. M.W.R.

N66-24191# Joint Publications Research Service, Washington, D. C.

SHIFTS IN THE LEVEL OF THE CONSTANT POTENTIAL OF THE CEREBRAL CORTEX AND THEIR FUNCTIONAL SIGNIFICANCE

V. F. Rusinov *In its* Bionics 20 Apr.1966 p 507–516 refs (See N66-24126 13-04) CFSTI: $9.10

Polarization of the cerebral cortex surface of a rabbit, using an anode of weak direct current (one to five mka), causes regular shifts in constant electric potential. Magnitude and direction of the shifted potential depend on the initial level. Polarization of the motor region of the cortex which affects one of the extremities can produce motor reactions in the case of previously indifferent stimulation by light or sound to the same part. The center of excitation caused by the polarization can be easily inhibited by amplifying the direct current acting on the cortex. There is complete curtailment of rhythmic oscillations of electrical activity in the cortex, but the excitation center remembers the rhythm of the pulsating current for many hours. M.W.R.

N66-24192# Joint Publications Research Service, Washington, D. C.

ON THE PROBLEM OF RELIABILITY OF OPERATION OF THE BRAIN OF A DOG UNDER THE EFFECT OF NOXIOUS ELEMENTS

V. A. Lovchikov *In its* Bionics 20 Apr. 1966 p 517–523 refs (See N66-24126 13-04) CFSTI: $9.10

The nerve centers which control conditioned reflexes in the dog exhibit a certain stability following various dosages of chloral hydrate and sodium amytal. While poisoning by toxic doses causes damage to individual nerve fibers of the brain, there are no essential changes in conditioned reflexes. Even with a lethal dose of caffeine, certain compensatory mechanisms operate to permit the conditioned reflex activity. Such investigations are considered in relation to the construction of computational automata which will retain their reliability in spite of defects in their structural elements. Representation of the high efficiency of the brain with low reliability of the individual nerve cells is considered an analogy to the problem in computation devices. Details of experiments with six dogs are presented. M.W.R.

N66-24193# Joint Publications Research Service, Washington, D. C.

CORRELATION ANALYSIS OF THE EEG OF A MAN BOTH IN THE NORMAL CONDITION AND WITH CEREBRAL CENTERS OF DAMAGE

O. M. Grindel', G. N. Boldyreva, and V. M. Andreyevskiy *In its* Bionics 20 Apr. 1966 p 524–537 refs (See N66-24126 13-04) CFSTI: $9.10

A comparison was made of electroencephalograms (EEG) obtained from humans with healthy brain tissue and those with tumors at various sites in the cerebral cortex. Correlation analysis methods were employed in the study, and various autocorrelation and mutual correlation functions are plotted to show differences in healthy and tumorous brain tissue. A significant sinephase nature of the electrical activity of symmetrical points of the cerebral cortex is exhibited by the healthy human at rest. In cases of brain pathology there is an increase in the frequency and regularity of the α-rhythm in regions remote from the site of the tumor. Periodic relationships and a time shift in all rhythm ranges are manifested by mutual correlations of the occipital and frontal regions of the healthy brain, whereas the nature of the function varies with the site in cases of brain tumors. The region of the cortex next to the tumor exhibits a periodic process with complete absence or sharp decrease in the random component, whereas in regions remote to the tumor the random process is retained. M.W.R.

N66-24194# Joint Publications Research Service, Washington, D. C.

STATISTICAL PROCESSING OF LOW-FREQUENCY BIOPOTENTIALS

V. A. Pryanishnikov *In its* Bionics 20 Apr. 1966 p 538–546 refs (See N66-24126 13-04) CFSTI: $9.10

Amplitude analyzers and pulse counters which have been used in nuclear physics researches are found to be applicable to statistical processing of the probability characteristics of various biopotentials within a frequency spectrum from zero to 1000 cycles/minute. Measurement errors are estimated to be less than 1% for one-dimensional distributions and less than 5% for joint distributions. The devices used and their calibrations are described, and various graphs plot functional distribution curves for brain measurements of the rabbit. M.W.R.

N66-24195# Joint Publications Research Service, Washington, D. C.

RECIPROCAL INNERVATION SYSTEM

R. I. Bekker *In its* Bionics 20 Apr. 1966 p 547–557 refs (See N66-24126 13-04) CFSTI: $9.10

Reciprocal innervation is treated as a special case of coordination in higher forms of animal life, and the construction of system which simulates walking processes is based on three assumptions: (1) the approaching excitation changes the state in the nerve cell, (2) excitations which reach the nerve cells from different paths act as one; and (3) secondary centripetal impulses cause alternate states of excitation and quiet in the nerve centers of antagonistic muscles during change reflexes. Reciprocal innervation of two muscles, flexor and extensor, is diagrammed for one, two, and four limbs; and diagrams include a contact neuron and an intermediate neuron. Intermediate as well as contact and integration neurons are proposed as the points of application of the impulses during sudden interference of the upper regions of the brain during spinal control of movements. It is noted that small motor neurons are detected along with the large motor neurons; these are identical in all respects, except that the small neurons are not excited during certain monosynaptic discharge of impulses. This is considered plausible if the small neuron corresponds to a propriocenter. M.W.R.

N66-24196# Joint Publications Research Service, Washington, D. C.

A GENETIC INFORMATION SYSTEM IN COMPARISON WITH ARTIFICIAL INFORMATION SYSTEMS AND SOME PROBLEMS IN BIONICS

N. N. Zhukov-verezhnikov, I. N. Mayskiy, G. P. Tribulev, V. Ya. Kop'yev, A. P. Pekhov et al *In its* Bionics 20 Apr. 1966 p 558–564 refs (See N66-24126 13-04) CFSTI: $9.10

A genetic-type information system is compared to an artificial information system from the point of view of solving problems in bionics and improving methods for simulating systems. Essential differences between the two types of systems are considered to be the following: (1) In artificial systems, recording is physical in nature, by use of mechanical, magnetic, or electronic devices; natural genetic information systems use chains of polymer molecules or chemical properties. (2) The information and actuating elements are disconnected from the main devices in artificial control systems; in genetic systems, the information elements are inherent to the system. (3) A genetic system is self-copying, and not limited to use of purely physical and external phenomena. (4) Genetic systems are capable of self-improvement and further development by the external and internal environment. Applications of and problems related to genetic systems are discussed in very general terms. M.W.R.

N66-24197# Joint Publications Research Service, Washington, D. C.

THE SIGNIFICANCE OF FLUCTUATION OF THE RHYTHM OF STIMULATIONS TO MAINTAIN THE TONUS OF THE CENTRAL NERVOUS SYSTEM

D. N. Menitskiy, V. A. Lovchikov, N. N. Vasilyevskiy, and G. G. Vartanyan *In its* Bionics 20 Apr. 1966 p 565–573 refs (See N66-24126 13-04) CFSTI: $9.10

This article discusses several investigations in connection with the effect of fluctuating the rhythm of stimulations in maintaining the tonus of the central nervous system. An hypothesis concerning the optimal interaction of the nervous centers is formulated which assumes a penalty for both redundant and insufficient afferentation, more adequately reflects the known representations of the mechanism for maintaining the tonicity of the central nervous system, and agrees with experiments on individual neurons and nerve centers. The hypothesis is also supported by experiments with conditioned reflexes under random reinforcement. The procedure ensures a more uniform arrival of information and does not lead to the development of experimental neurosis (as a result of the unexpected breaking of rhythm), or to experimental sleep (as a result of the monotony of the rhythm). In spite of the usefulness of rhythm or stimulation stereotype in the activity of the nervous system and the occurrence of stereotypes among the multiple effects of the external environment, the presence of rigid and uniform stereotypes leads to a lowering of the tonicity of the nervous system. R.N.A

N66-24198# Joint Publications Research Service, Washington, D. C.

THE ROLE OF SYNCHRONIZATION OF SHIFTS OF THE SOMATIC AND VEGETATIVE FUNCTIONS IN ENSURING RELIABILITY OF PHYSICAL OPERATIONS IN CHILDREN

P. I. Gumener *In its* Bionics 20 Apr. 1966 p 574–585 refs (See N66-24126 13-04) CFSTI: $9.10

This study examined the role of synchronizing shifts of the somatic and vegetative functions to ensure the reliable physical operations of children. The study showed that regulating the physiological functions in children during rhythmic labor motions may manifest itself in slow oscillations of the level of vegetative and motor functions. This control is worsened by limiting the free condition of the work. Controlling the interrelation of vegetative and motor functions determines good synchronization not of individual motions with individual heart beats or respiratory movements, but synchronization of the shift of the average level of the given function. Ensuring the reliability of the work effect requiring relative stability of the corresponding forces may be combined with activity waves reflecting significant oscillations not only of the vegetative functions but also of the determinant motor parameters. Under these conditions reliability of the work effect is promoted by a different condition for controlling the oscillations of these two groups of parameters: the compensation control condition for the first, and the programmed control condition for the second. R.N.A.

N66-24199# Joint Publications Research Service, Washington, D. C.

ILLNESS AS A PROCESS OF EMERGENCY CONTROL IN A LIVING ORGANISM

Ye. V. Gubler *In its* Bionics 20 Apr. 1966 p 586–589 (See N66-24126 13-04) CFSTI: $9.10

This paper discusses illness as a process of emergency control in a living organism. The purpose of this control is self-preservation and self-restoration of the organism. The role of this control is examined in relation to its effect upon physiological control which maintains the functions of an organism within certain limits. During illness the emergency control takes over and exceeds these limits. For example, during illness the body temperature is increased, pain occurs, the nervous activity is inhibited, and the functioning of certain organs is strengthened. The emergency control is also evidenced in such physiological reactions as regeneration, healing, and immunity; complex behavioral acts such as increased circulation and breathing rates, and hormone excretion; reflex reactions; fainting; and infectious diseases. R.N.A.

N66-24200# Joint Publications Research Service, Washington, D. C.

THE DYNAMICS OF CONTROL OF WATER METABOLISM AND THE CONDITIONS OF CONVERSION OF IT INTO THE AUTOOSCILLATORY CONDITION IN BEAN PLANTS

V. G. Karmanov and V. N. Savin *In its* Bionics 20 Apr. 1966 p 590–596 refs (See N66-24126 13-04) CFSTI: $9.10

The dynamics of water exchange in plants growing in soil under optimal moisture conditions were investigated and compared to plants which have survived the influence of soil dryness. It was determined that when growing under conditions of sufficient moisture, plants exhibit a clear diurnal course of transpiration and regulate their own physiological state comparatively quickly and smoothly in response to a sharp change in the external environment. Cessations of both transpiration and water motion were observed in plants that were subjected to dry soil conditions. After watering and complete restoration of their turgor, these plants reacted to the removal of light or watering by a change in the intensity of the water volume, and by a transition to an oscillatory nature. This oscillatory nature of the watering exchange in plants under invariant conditions of the external environment was considered to be an autooscillatory process. An analogy is then drawn between the oscillations in plants and the autooscillations in any technical system. H.S.W.

N66-24219# Picker X-ray Corp., Cleveland, Ohio.

INDUSTRIAL ANALYSIS OF PROMETHIUM-147 X-RAYS FOR RADIOGRAPHY AND IMAGING READOUT

E. W. Coleman, T. C. Furnas, J. Ball, M. R. Rosumny, and D. W. Beard *In* ORNL Proc. of Symp. on Low-Energy X-ray Sources and Gamma Sources and Appl. Nov. 1965 p 222–230 (See N66-24206 13-24) CFSTI: HC $4.00/MF $1.75

In experiments with a 100-Ci ^{147}Pm source on radiography and fluoroscopy of medical phantoms and of various metal step wedges with standard penetrameters, exposure times required generally were excessively long. Studies of the spectral output and use of the source to excite secondary spectra, which were evaluated with a scintillation detector and 400-channel pulse height analyzer, demonstrated interesting capabilies on sorting materials. A third series of experiments was on determination of the effective focal spot size and relating this to theoretical excitation conditions in the source. Author (NSA)

N66-24221# Johns Hopkins Univ., Baltimore, Md.
MEDICAL APPLICATIONS OF LOW-ENERGY X-RAY AND GAMMA RADIATION SOURCES
Henry N. Wagner, Jr. *In* ORNL Proc. of Symp. on Low-Energy X-ray Sources and Gamma Sources and Appl. Nov. 1965 p 239–242 ref (See N66-24206 13-24) CFSTI: HC $4.00/MF $1.75

Experiments using a nuclear image amplifier with ^{133}Xe and ^{99m}Tc for measuring blood flow and respiration are described briefly. Initial results were found to be promising. NSA

N66-24222# Harvard Univ., Cambridge, Mass. School of Dental Medicine.
USE OF IODINE-125 FOR INTRAORAL X RADIOGRAPHY
Rune Söremark *In* ORNL Proc. of Symp. on Low-Energy X-ray Sources and Gamma Sources and Appl. Nov. 1965 p 243–256 refs (See N66-24206 13-24) CFSTI: HC $4.00/MF $1.75

The use of ^{125}I as an X-ray source for dental radiography is described. It is pointed out that ^{125}I can be concentrated to a very small focus and thus it is possible to have a rather short distance between the source and object. Exposure time may be reduced without impairing the quality of the roentgenograms and various types of exchangeable collimators may be used in order to diminish unsuitable radiation. Ordinary intraoral roentgenograms can easily be taken by means of a simple film-source holder fixed to the teeth. For panoramic roentgenograms the unit is small enough to be placed intraorally in a holder and collimator fixed to the teeth. The collimator is so constructed that an exposure of the upper and/or lower jaws may be made on the extra-orally placed film. As opposed to the conventional dental X-ray apparatus, the ^{125}I unit requires a minimum of space, is easy to transport, and is entirely independent of electrical power. A fast and high resolution Polaroid film eliminates the need for dark room facilities. Exposure data relating to various human objects are included. NSA

N66-24223# Chicago Univ., Ill. Dept. of Radiology.
RADIOISOTOPIC DEVICE FOR MEASURING BONE MINERAL
Lawrence H. Lanzl and Nels Strandjord *In* ORNL Proc. of Symp. on Low-Energy X-ray Sources and Gamma Sources and Appl. Nov. 1965 p 257–276 refs (See N66-24206 13-24) CFSTI: HC $4.00/MF $1.75

An instrument using radioactive ^{125}I was devised for nondestructive determination of mineral changes in the skeleton by measuring the transmission of a small beam of radiation emanating from ^{125}I through a single human finger bone. For small animals, the rear leg is used. Radiographs must be used for accurately positioning the anatomical part under consideration. Built into the unit are an automatic repositioning feature and an automatic print-out device. The absorption coefficients of bone in vivo can be determined to an accuracy of ±1%. The apparatus is being used to study osteoporosis in post-menopausal females, including the effect of stilbesterol in decreasing osteoporosis, and demineralization in experimental animals. Author (NSA)

N66-24224# Wisconsin Univ., Madison.
BODY COMPOSITION DETERMINATION BY DIFFERENTIAL ABSORPTION OF MONOCHROMATIC X-RAYS
James A. Sorenson and J. R. Cameron *In* ORNL Proc. of Symp. on Low-Energy X-ray Sources and Gamma Sources and Appl. Nov. 1965 p 277–289 refs (See N66-24206 13-24) CFSTI: HC $4.00/MF $1.75

The technique of determining the fractional composition of a two-component system by X-ray beam attenuation measurements was studied. The method was tested on sodium acetate–polyethylene mixtures of known compositions and was applied to samples of animal muscle and fat. The results were within 3% of other independent determinations. Statistical errors and the problems of nonmonochromatic X-ray sources and scattered radiation were also examined. It was concluded that the technique is an accurate method for quantitative determination of the composition of the mixtures studied. Author (NSA)

N66-24225 Argonne National Lab., Ill.
IN VIVO MEASUREMENT OF BONE MINERAL CONTENT BY A TRANSMISSION TECHNIQUE
Leonard S. Goodman and Bertram Levin (Michael Reese Hosp.) *In* ORNL Proc. of Symp. on Low-Energy X-ray Sources and Gamma Sources and Appl. Nov. 1965 p 290–294 refs (See N66-24206 13-24) CFSTI: HC $4.00/MF $1.75

A preliminary investigation of a method for in vivo determination of bone mineral content is presented. Linear transverse scans of transmission are made across a bone for two different monoenergetic X-rays. The information so obtained can be reduced to give the $Ca_3(PO_4)_2$ equivalent per centimeter of bone. The transmission scan also yields an effective diameter of the bone. Division of the equivalent amount of tricalcium phosphate by the diameter yields an index of mineral content which has less scatter from individual to individual than the amount alone. Author (NSA)

N66-24227# Viso Corp., Detroit, Mich.
PORTABLE DEVICES FOR ISOTOPE CHEST RADIOGRAPHY AND OTHER APPLICATIONS
Farno L. Green *In* ORNL Proc. of Symp. on Low-Energy X-ray Sources and Gamma Sources and Appl. Nov. 1965 p 309–328 refs (See N66-24206 13-24) CFSTI: HC $4.00/MF $1.75

Ytterbium 169 was found to be the best isotope source now available for medical diagnostic radiography. Ytterbium sources were used for general diagnosis in a lightweight system with a tripod-mounted radiographic exposure unit and X-ray film cassettes. The Viso chest radiography system is easily transported into essentially any populated area, assembled in minutes, and operated without electrical power. Only minor maintenance is required. Such systems also allow very low dose to the patient and to the operator. Author (NSA)

N66-24305# Joint Publications Research Service, Washington, D. C.
ACUTE RADIATION ILLNESS AND DOSAGE DETERMINATION

N. A. Kurshakov, ed. 12 Apr. 1966 42 p Transl. into ENGLISH from the book "Ostraya Radiatsionnaya Travma u cheloveka" Moscow, 1965 p 3, 5–45
(JPRS-35011; TT-66-31449) CFSTI: $2.00

CONTENTS:
1. THE PATHOGENESIS AND GENERAL CLINICAL CHARACTERISTICS OF ACUTE RADIATION ILLNESS N. A. Kurshakov p 2–24
2. DETERMINATION OF ABSORBED DOSES R. D. Drutman, M. S. Malysheva and Yu. M. Shtukkenberg p 25–35

N66-24345# RAND Corp., Santa Monica, Calif.
COMPUTER STUDIES OF RESPIRATION
T. W. Murphy May 1965 75 p refs
(Grants NIH GM-09608-04; NIH GH-09608-03; NIH HE-08186-03)
(RM-4406-NIH; AD-615635) CFSTI: HC $3.00/MF $0.75

An approach to respiratory studies is described which utilizes modern data-processing (computing) equipment. The calibration of the rather complex system is described. The abilities of the device are demonstrated in an investigation of the tidal volume-dead space relationship. Advantages of this approach are discussed. Author (TAB)

N66-24439# Joint Publications Research Service, Washington, D. C.
SELECTIONS FROM NEUROHUMORAL MECHANISMS OF RETICULAR FORMATION OF THE BRAIN STEM
R. Yu. Il'yuchenok 6 Apr. 1966 44 p Transl. into ENGLISH from the book "Neyro-Gumoral'nyye Mekhanizmy Retikulyarnoy Formatsii Stvola Mozga" Moscow, 1965 p 197–215, 216–222
(JPRS-34906; TT-66-31344) CFSTI: $2.00

Several experiments were conducted to study the question of chemical sensitivity of nerve elements in brain stem reticular formation, and to assess the various theories concerning the mechanism of the ascending activation system. The question of whether the activation effect of catecholamines and adrenomimetics is a result of the direct action of these drugs on the neurons of brain stem reticular formation, or is connected with blood circulation changes, was also considered. Animal experiments, using a variety of drugs, are described, and the findings are assessed. Data regarding the dependence of the degree of EEG changes on the rate of dose administrations are reported, along with findings on the influence of pharmacological substances on the mechanisms of the arousal reaction. The inhibitory action of serotonin is also assessed. Several techniques used in studying the neurohumoral mechanisms of the brain stem reticular formation are summarized. M.G.J.

N66-24448# Joint Publications Research Service, Washington, D. C.
OCCUPATIONAL PECULIARITIES OF PERCEPTION OF ONE HUMAN BEING BY ANOTHER
A. A. Bodalev 25 Mar. 1966 21 p refs Transl. into ENGLISH from the book "Vospriyatiye Cheloveka Chelovekom" Leningrad, Publ. House of Leningrad Univ., 1965 p 106–122
(JPRS-34734; TT-66-31173) CFSTI: $1.00

The characteristics and behavior of an individual which impress persons belonging to different occupational groups were investigated. Groups of persons were asked what they noticed or remembered most about others. The groups included wrestlers talking about opponents, basketball coaches about players, teachers about pupils, and student artists about their classmates. It was found that the artist group provided particularly accurate evaluations of the subject with respect to proportions, shape, and location of features. In another study, choreography teachers described friends, and it was found that they stressed overall build and mobility. It was concluded that (1) the perception of one human being by another is a direct visual reflection of one human being by another; (2) the volume and degree of reliability of the information depend on the peculiarities of the person perceived and of the person perceiving; and (3) the perception is affected by conditions under which one person is perceived by the other. N.E.N.

N66-24449# Joint Publications Research Service, Washington, D. C.
TRANSLATIONS FROM *GIGIYENA I SANITARIYA* (HYGIENE AND SANITATION), MOSCOW, NO. 12, 1965
22 Mar. 1966 25 p refs Transl. into ENGLISH of five articles from Gigiyena i Sanit. (Moscow), no. 12, 1965 p 50–51, 54–57, 98–102
(JPRS-34665; TT-66-31104) CFSTI: $1.00

CONTENTS:
1. QUICK DETERMINATION OF NOXIOUS ADMIXTURES IN THE AIR BY MEANS OF REAGENT PAPER G. A. Parsadanyan p 1–2 refs
2. VITAL STAINING OF TISSUES IN THE DETERMINATION OF STANDARDS OF ATMOSPHERIC POLLUTION A. I. Kopanev p 3–8 refs
3. JOINT MEETING OF ALL-RUSSIAN SOCIETY OF HYGIENISTS, RESEARCH INSTITUTE OF HYGIENE IMENI F. F. ERISMAN, AND SOCIETY OF CARDIOLOGISTS L. I. Maksimova p 9–10
4. READERS' CONFERENCE ON WORK OF GIGIYENA I SANITARIYA V. F. Katsitadze p 11–12
5. DATA ON NATURAL POPULATION MOVEMENT IN THE USSR Z. G. Frenkel' and T. S. Soboleva p 13–18

N66-24461# School of Aerospace Medicine, Brooks AFB, Tex.
GLUCOSE TOLERANCE RESPONSES IN YOUNG ADULTS OF SHARPLY CONTRASTING PERIODONTAL STATUS Final Report, Feb. 1963–Apr. 1964
Ira L. Shannon, Timothy J. O'Leary, William A. Gibson, and Robert L. Jenson Feb. 1966 13 p refs
(SAM-TR-66-9; AD-629741) CFSTI: HC $1.60/MF $0.50

Conventional oral glucose tolerance tests were performed for 100 systemically healthy young adult males. Half of these subjects were classified as being relatively free of periodontal involvement (GPI=1.60), while the other half presented evidence of loss of alveolar support and, in general, could be classified as requiring periodontal treatment (GPI=3.15). Statistical analyses sought differences in glucose responses between the two groups at all sampling intervals. No significant differences were found. These results confirm previous observations from this laboratory that glucose tolerance testing cannot be employed as an index of susceptibility of periodontal involvement in this age group. Author (TAB)

N66-24463# Honeywell, Inc., St. Paul, Minn. Research Dept.
A STUDY OF VISUAL SEARCH USING EYE MOVEMENT RECORDINGS First Annual Report, 1 Jan.–31 Dec. 1965
L. G. Williams 28 Feb. 1966 79 p refs
(Contract Nonr-4774(00))
(Rept.-12009-IR1; AD-629624) CFSTI: HC $3.00/MF $0.75

The object of study in the present program is visual search in crowded fields. The basic goal is to predict search times for arbitrary targets in arbitrary backgrounds. The basis of our framework is that the specific objects at which an observer looks depends on the specific targets for which he searches. The average time to find a given target depends on what types of objects he is likely to look at and the numbers and types of objects in the search field. The report contains three appendices. Appendix A describes the apparatus used in the present studies and the rationale for measuring eye fixations. Appendix B is a methodological study which establishes the validity of generalizing to the real world from the restrictive laboratory situation. Appendix C shows how eye fixation data can be used to predict search times for specific targets in arbitrary fields. TAB

N66-24470# Joint Publications Research Service, Washington, D. C.
TRANSLATIONS FROM *VOPROSY PSIKHOLOGII* (PROBLEMS OF PSYCHOLOGY), NO. 6, 1965
17 Mar. 1966 59 p refs Transl. into ENGLISH from Vopr. Psikhologii (Moscow), no. 6, Nov.–Dec. 1965
(JPRS-34596; TT-66-31035) CFSTI: $3.00

CONTENTS:

1. SOME CONDITIONS FOR THE EVOLUTION OF COLLECTIVIST ATTITUDES AMONG BOARDING SCHOOL PUPILS Ye. S. Makhlakh p 1–20 refs
2. THE PRINCIPLE OF EQUISIGNIFICANCE AND THE PROBABILISTIC CONCEPTION OF PSYCHIC PHENOMENA A. I. Rozov and Ya. L. Kolominskiy p 21–34 refs
3. EXACTNESS OF PROGRAMMED EXAMINATION IN PROGRAMMED MACHINE INSTRUCTION N. U. Koyda p 35–38 refs
4. ALGORITHMS OF ACTION OF THE HUMAN OPERATOR IN EMERGENCY SITUATIONS B. M. Yankelevich p 39–48 refs
5. QUANTITATIVE EVALUATION OF ELECTROENCEPHALOGRAPHIC WAVEFORMS Ye. Ya. Voytinskiy and O. M. Lebedev p 49–52

N66-24473# Federal Aviation Agency, Oklahoma City, Okla.
INTRARENAL HEMODYNAMIC CHANGES FOLLOWING ACUTE PARTIAL RENAL ARTERIAL OCCLUSION
Charles M. Brake, Dale Reins, Lorenz E. Wittmers, and Lerner B. Hinshaw Oct. 1965 10 p refs
(AM-65-27)

Both an increase and a decrease in total renal vascular resistance, following a period of total renal artery occulsion, have been reported from this laboratory. The duration of the occlusive period and height of the perfusion pressure were found to prescribe consistently the hemodynamic response. The present study, using adult mongrel dogs, indicates that, following a period of partial occlusion, in a critical range of renal pressure (40% to 50% of control), intrarenal hemodynamic changes mimicked those seen after total obstruction of blood flow. Reactive hyperemia was not observed. Author

N66-24493*# Florida State Univ., Tallahassee. Dept. of Statistics.
VARIATION IN MEASUREMENTS OF MICROBIAL LOADS
Richard G. Cornell 16 Feb. 1966 11 p *lt* Tech. Rept.-2
(Grant NGR-10-004-029)
(NASA-CR-74549) CFSTI: HC $1.00/MF $0.50 CSCL 06M

Distribution of microbial load measurements based on bioassays are investigated to see if the maximum tolerance is exceeded. A measurement model is used which determines the mean load for the population from which the item being tested is taken. Consideration is given to variations involved in these measurements, such as variation (1) from one item to another of the same type and (2) in microbial density over the surface and interior of an item. An assay procedure is proposed to determine the probability that a microorganism will contaminate a spacecraft component, and the necessary equations are included. M.W.R.

N66-24548*# Lockheed Missiles and Space Co., Sunnyvale, Calif.
STATE-OF-THE-ART BIOLOGICAL DATA HANDBOOK Final Report
M. A. Mc Lennan et al Aug. 1965 86 p refs
(Contract NAS2-2479)
(NASA-CR-74645; LMSC-4-05-65-4) CFSTI: HC $3.00/MF $0.75 CSCL 06B

This handbook is intended to furnish the user of biological data with a convenient source of information about the characteristics of available flight qualified or flight eligible sensors and equipment. Flight eligible indicates that the design is flight qualifiable but has not passed qualification tests. This information will also enable the data user to make a first approximation of his data system size, the biological data loads, possible data compression techniques, and telemetry system capabilities. R.N.A.

N66-24557# Library of Congress, Washington, D. C. Aerospace Technology Div.
BIOELECTRICALLY CONTROLLED UPPER EXTREMITY PROSTHESES Surveys of Soviet Scientific and Technical Literature
Christopher H. Dodge 19 Apr. 1966 45 p refs Review Article
(ATD-66-46)

A Soviet literature review was conducted on all pertinent technical data available on the design, operation, and specifications of upper extremity prosthetic devices and components. The articles summarized in this paper deal with problems of the design, testing, and refinement of bioelectrically controlled upper extremity prostheses, especially prosthetic hands. Included are articles on electronic circuits for multifunctional prostheses with bioelectric control, modes of controlling multifunctional bioelectric prostheses, design requirements for a feedback scheme for sensing grasping force in bioelectric prostheses, distribution of mass in forearm prostheses, electric activity of muscles operating at TsNIIPP arm prosthesis, methods of testing miniaturized reducing gear assemblies, a hand for bioelectrically controlled prostheses, and servomotor drive for a prosthetic hand. Also included are summaries of two articles on applications of bioelectric control research in space and industry. R.N.A.

N66-24559# Grumman Aircraft Engineering Corp., Bethpage, N.Y.
RADIATION SHIELDING CONSIDERATIONS FOR INTERPLANETARY SPACECRAFT
Carl F. Kottler, Jr. Jan. 1966 48 p refs
(RE-236)

This report presents an analysis of the radiation dosage astronauts would receive when protected by various combinations of passive shielding, as a function of mission duration and the probability of exceeding the statistically predicted dosage of the NASA model solar proton environment. Dosages to the internal organs and the skin (taking into account self-shielding) are determined as a function of the energy of the incident particles, and are compared with permissible dosages. The shielding and associated effective cutoff energies required for protection against alpha particles and protons are

calculated for mission durations between 1 week and 2 years, with three probabilities of exceeding the indicated dosages (0.1, 0.01, and 0.001). Parametric curves for typical aluminum structure, polyethylene shield, hydrogen fueled spacecraft are shown. An introductory description of the solar atmosphere, solar activity, and associated geomagnetic phenomena is also presented along with a number of reference tables. Author

N66-24561# Federal Aviation Agency, Oklahoma City, Okla.
EQUIDISTANCE TENDENCY AND ITS CONSEQUENCES
Walter C. Gogel Apr. 1965 19 p refs
(AM-65-11)

The equidistance tendency is the tendency for objects or other inhomogeneities in the field-of-view to appear at the same distance as each other with the strength of this tendency being inversely related to directional separation. The evidence for the existence of the equidistance tendency and for its ability to modify the perceived depth resulting from size or stereoscopic cues is reviewed. The equidistance tendency is discussed as a disturbing factor in visual experimentation and as a necessary factor in the understanding of Emmert's law, the moon illusion, and similar phenomena. Several possible explanations for the equidistance tendency are evaluated in terms of the range of phenomena with which it is identified. Author

N66-24667 Joint Publications Research Service, Washington, D. C.
STUDIES IN LABOR HYGIENE AND OCCUPATIONAL DISEASES
A. K. Gus'kova et al 6 Apr. 1966 35 p refs Transl. into ENGLISH of four articles from Gigiyena Truda i Prof. Zabolevaniya (Moscow), no. 1, Jan. 1966
(JPRS-34928; TT-66-31366) CFSTI: $2.00

CONTENTS:

1. WORKING CONDITIONS AND HEALTH STATUS OF WORKERS AT THE UNITED INSTITUTE OF NUCLEAR RESEARCH A. K. Gus'kova, A. I. Ponizovskaya, Ye. A. Denisova, V. V. Volkovitskaya, Ye. N. L'vovskaya et al p 1–9 refs
2. THE RESULTS OF DYNAMIC OBSERVATIONS OF THE STATE OF HEMOPOIESIS IN PERSONS SUBJECTED TO THE CHRONIC EFFECT OF IONIZING RADIATION V. V. Sokolov and I. A. Gribova p 10–16 refs
3. THE VALUE OF A BRIGHT WORKING SURFACE Yu. D. Khilov p 17–21 refs
4. THE DEVELOPMENT AND COURSE OF SILICOSIS AFTER CESSATION OF CONTACT WITH DUST V. N. Palkin p 22–28 refs

N66-24676# Federal Aviation Agency, Oklahoma City, Okla. Office of Aviation Medicine.
DETERMINATION OF CENTERS OF GRAVITY OF CHILDREN, SITTING AND STANDING
John J. Swearingen and Joseph W. Young Sep. 1965 17 p refs
(AM-65-23)

There have been numerous instances in which small children have been thrown out over the top of the seat belt in rough air and airline crashes, indicating that the present seat belt is not a satisfactory restraint device for children 2 to 10 years old. Data defining the location of the center of gravity of children of different ages in the sitting position have not been available and are urgently needed to serve as a basis for developing an improved restraint system for children. To supply these data for design requirements approximately 1,200 children (ages 5 to 18) were balanced on a specially designed center-of-gravity machine in sitting and standing positions. The center of gravity of small children in the standing position will be most useful in the design of flotation equipment. This study shows that the center of gravity for small children sitting in an airline seat is located roughly 5 in. above the seat belt and explains why children slip out over the seat belt during crash decelerations. Complete data of location of centers of gravity along with anthropometric data of the children studied are presented. Author

N66-24690*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
STERILIZATION—A SELECTED BIBLIOGRAPHY FROM THE LITERATURE RETRIEVAL SYSTEM, SPACE BIOLOGY BRANCH
Mar. 1966 25 p refs
(NASA-TM-X-55457; X-450-66-53) CFSTI: HC $1.00/MF $0.50 CSCL 06F

An annotated bibliography is presented with topical headings. These headings include: (1) clean rooms; (2) decontamination; (3) sterilization methods, i.e., air filtering, chemicals, and heat; (4) methods and statistics for detection and monitoring of microorganisms; (5) spacecraft sterilization; and (6) survival, i.e., viability of microorganisms. D.T.

N66-24694*# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
A QUANTAL INTERPRETATION OF SENSORY CHANNEL UNCERTAINTY AND REACTION TIME AND THE PSYCHOLOGICAL TIME QUANTUM AND THE DISCRIMINATION OF SUCCESSION
Alfred B. Kristofferson Washington, NASA, May 1966 39 p refs
(Contract NAS2-2486)
(NASA-CR-455) CFSTI: HC $2.00/MF $0.50 CSCL 05J

A quantal concept of psychophysiological time is defined in quantitatively precise terms. The behavioral routes into the concept are given as: the main parameter of a quantal model of the variability of reaction time; time difference between independent signals necessary for 100% detection of succession; and the increment added to reaction time by channel uncertainty. The quantities are discussed, and experimental results are tabulated. Results suggest that zero to one temporal quantum is consumed in switching attention between sensory channels when conditions are optimal. The principal evidence further shows that the three quantities are equal in magnitude, highly correlated over individuals, and the same for different sensory channels. N.E.N.

N66-24699# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
REVIEW OF COMPENDIUM "INFLUENCE OF IONIZING RADIATION ON THE FUNCTIONING OF THE HIGHER SECTIONS OF THE CENTRAL NERVOUS SYSTEM OF OFFSPRING"
N. L. Livshits 28 Sep. 1965 9 p Transl. into ENGLISH from Patol. Fiziol. i Eksperim. Terapiya (Moscow), v. 7, no. 3, 1963 p 90–91
(FTD-TT-65-860/1+4; TT-65-64182; AD-622457) CFSTI: HC $1.00/MF $0.50

Several articles are reviewed in which investigations of the radiosensitivity of the central nervous system during ontogenesis are reported. Female rats, mice, and other rodents were irradiated with X- and gamma-rays at various times during pregnancy. The functioning of reflexes and the ability of the progeny to learn and perform complicated tasks were tested. In all cases, the animals exhibited reduced sensitivity to stimuli, and a reduced ability to learn. D.T.

N66-24706# Library of Congress, Washington, D. C. Aerospace Technology Div.

CBE FACTORS Monthly Survey No. 1

[1966] 71 p refs

(ATD-66-4; AD-628294) CFSTI: HC $3.00/MF $0.75

The report is a survey by a team of analysts covering the following areas: Chemical factors: Pesticides; Herbicides; Fertilizers; Psychotomimetics; Other chemicals. Biological factors: Pathogens. Environmental factors: Aerosols; Ecology; Micrometeorology; Soil Science. This combined report, the first of a series of monthly surveys, includes items selected for catch-up purposes, as well as current materials. The proportion of current material will tend to increase in future reports. TAB

N66-24714# Goteborg Univ. (Sweden). Dept. of Histology.

RESEARCH ON INTRA NEURONAL MECHANISMS FOR INFORMATION STORAGE Technical Report No. 1

Holger Hyden 31 Mar. 1965 52 p refs

(Grant AF-EOAR-63-28)

(AFOSR-66-0364; AD-628899) CFSTI: HC $3.00/MF $0.50

Different types of micro-chemical methods used for analysis of neurons and glia are discussed. As an introduction to a discussion of a biochemical response in neuron and glia during learning, a few basic problems are mentioned and some pertinent results are given. The neurons are especially rich in RNA and during a life-cycle in man, there can be discerned a rise, steady level and fall in the RNA content of moto-neurons. What this cycle of changes means from a functional point of view, seems to be an important problem to consider for future studies. During sleep-wakefulness, rhythmic enzyme changes were recorded alternating between the neurons and glia in the caudal part of the reticular formation in rabbits. These changes are taken to reflect circadian, rhythmic processes underlying the biological clock phenomenon. During physiological stimulation of the nervous system in mammals, an increase of the RNA content, total proteins and enzyme activities have been found in the neurons, and a decrease in the surrounding glia. To elucidate this phenomenon, a kinetic study and other experiments were carried out. The results showed that the neuron and its glia are coupled as a unit from an energetic point of view. Some RNA data from a study of Parkinson's disease are given to show that one part of the unit can influence the other from a biochemical as well as from a functional point of view.

Author (TAB)

N66-24722# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

ELECTRON MICROSCOPY METHOD OF INVESTIGATION OF BIOLOGICAL OBJECTS

V. I. Biryuzova, V. L. Borovyagin, V. P. Gilev, N. A. Kiselev, A. S. Tikhonenko et al 13 Apr. 1965 250 p refs Transl. into ENGLISH of the book "Elektronnomikroskopicheskiye Metody Issledovaniya Biologicheskikh Ob'yektov" Moscow, Izd. Akad. Nauk SSSR, 1963 p 1–203

(FTD-MT-64-149; TT-65-63947; AD-621062) CFSTI: HC $4.00/MF $1.25

Basic methods of investigating biological objects are outlined. Special features of biological preparations which impart characteristic features to the process of preparing specimens are examined. Methods of contrasting with the help of shadowing, dyeing with salts of heavy metals, and also the method of negative contrasting are examined in detail. Various means of preparing replicas are described. The questions of fixation and dehydration of objects and the methodology of preparing ultrathin sections are examined in detail. Some practical problems of working with the electron microscope and questions of photographic technique are outlined briefly. Author (TAB)

N66-24740# Wichita Univ., Kans. Dept. of Aeronautical Engineering.

INVESTIGATION OF THE CONCEPT OF DIRECT FLIGHT CONTROL Final Report

Andrew Craig Aug. 1965 36 p refs

(Contract DA-31-124-ARO(D)-231)

(AR-65-1; AROD-4837-1; AD-628087) CFSTI: HC $2.00/MF $0.50

A system which provides direct and independent control of flight path speed, heading, and angle with the horizon was synthesized and evaluated in an analog computer simulation. Performance by subjects whose piloting experience varied from zero flight hours to four thousand flight hours was compared using direct control and conventional control systems. Two primary results were obtained: first, the performance of a subject with no flight experience using direct control was equal or superior to the performance of a subject of 4,000 hours experience using conventional controls, performance being measured in terms of mean square deviation from a prescribed flight path; second, performance improvement varied inversely with pilot experience. The resulting control scheme utilized closed-loop devices with emphasis placed on simplicity and reliability. Author (TAB)

N66-24758# Joint Publications Research Service, Washington, D.C.

SOME MEDICAL CONCLUSIONS FROM THE VOSKHOD-2 SPACE WALK

Ye. Karpov 14 Apr. 1966 10 p Transl. into ENGLISH from Krasnaya Zvezda (Moscow), 18 Mar. 1966 p 4

(JPRS-35054; TT-66-31492) CFSTI: $1.00

Medical conclusions from the Voskhod-2 space walk flight are discussed. An account of the biomechanical and medical training of the flight crew is given. Emotional tension was noted in both astronauts; but the emotional intensity in general was moderate and did not greatly affect the activity of the crew. On opening the hatch of the exiting lock and on entering open space, the astronaut's pulse grew rapidly to 150–152 per minute. It is concluded that more complex and prolonged manned flights in outer space are possible from the medical and biological points of view.

L.S.

N66-24767# Naval Air Development Center, Johnsville, Pa.

PSYCHOPHYSICAL METHODOLOGY II: COMPARISON OF MEANS AND OF STANDARD DEVIATIONS OF THE ASCENDING AND DESCENDING METHOD OF LIMITS

Robert M. Herrick 31 Dec. 1965 17 p refs

(NADC-MR-6508; AD-628995) CFSTI: HC $1.60/MF $0.50

Assume that the probability of a 'yes' response increases as the stimulus intensity increases. Then, on the basis of probability considerations alone (a) the mean threshold of the descending method of limits (DML) is greater than the mean threshold of the ascending method of limits (AML) and (b) sigma of the DML threshold distribution may be greater than, equal to, or less than sigma of the AML threshold distribution. Therefore, (a) the present method for evaluating errors of expectation and habituation is erroneous, (b) the 'just not noticeable difference' (JNND) should always be larger than the 'just noticeable difference' (JND), (c) conclusions about relative precision based on a comparison of sigmas are wrong. Author (TAB)

N66-24773# Pittsburgh Univ., Pa. Graduate School of Business.
DIFFERENTIAL RESPONSE TO APPRAISAL AND GOAL SETTING AS A FUNCTION OF SELF, INTERACTION AND TASK ORIENTATION
Bernard M. Bass May 1964 18 p refs
(Contract Nonr-624(14))
(TR-3; AD-600296) CFSTI: $0.50

Sixty graduate students met periodically for 15 weeks in training groups. Midway, half of the men were counseled individually 1 to 1-1/2 hours by a peer from the other half. The counselees were the men most extreme in scores in self, interaction or task-orientation. The counselors were the remaining men. Counseling was devoted either to appraising past performance or to setting future goals. Generally, self-oriented students were significantly less likely to agree with their counselors as to what had been discussed in counseling and to particularly favor past performance appraisal over future goal setting. Author (TAB)

N66-24782# Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.
A PRELIMINARY STUDY OF ACQUIRING CROSS-CULTURAL INTERACTION SKILLS THROUGH SELF-CONFRONTATION Final Report, Jul.-Aug. 1964
Donald B. Haines and Herbert T. Eachus Sep. 1965 50 p refs
(AMRL-TR-65-137; AD-624120) CFSTI: HC $2.00/MF $0.50

An experiment was carried out to assess the relative effectiveness of two methods of training USAF military advisors in cross-cultural skills. A scenario was constructed requiring subjects to play the role of an American USAF Captain who had to interact, in specified ways with a 'foreign counterpart,' a role played by an actor. A list of 34 behaviors appropriate to the situation and fictitious culture were provided the subject. The behaviors required ranged from actions, gestures, etc. which were similar to those in our own society, to those which were considerably different. Twenty-three male subjects were divided into control and experimental groups and taught the desired behaviors by two methods: (1) Verbal coaching after a role-playing session (2) selfconfrontation by a videotape replay after a role-playing session. Considerable improvement resulted from these methods. The experiment confirmed the effectiveness of self-confrontation as a training technique for the rapid acquisition of complex and subtle skills of interaction—an area of difficulty encountered by USAF advisors on counterinsurgency training missions. Author (TAB)

N66-24783# Aerospace Medical Div. Aeromedical Research Lab. (6571st), Holloman AFB, N. Mex.
AN INVESTIGATION OF VISION DURING INVOLUNTARY SACCADIC EYE MOVEMENTS
Robert W. Ebbers (M.S. Thesis—Indiana Univ.) Feb. 1966 42 p refs
(ARL-TR-66-4; AD-629078) CFSTI: HC $2.00/MF $0.50

The purpose of the investigation reported here was to determine whether or not vision is present during involuntary saccades. The results indicate that vision is present, though impaired, during the involuntary saccades. Evidence is also presented which indicates that an intensity threshold factor is involved. Further, it is strongly suggested that the visual impairment is due to a blue or smear of the retinal image. TAB

N66-24820# Monsanto Research Corp., Everett, Mass.
EFFECTS OF SELECTED STRAINS OF MICROORGANISMS ON THE COMPOSITION OF FUELS AND LUBRICANTS Final Report, 1 Sep. 1962-27 Nov. 1964
Glenn R. Wilson, John O. Smith, H. F. Martin, Dolph Klein, E. C. Harrington et al Wright-Patterson AFB, Ohio, Res. and Technol. Div., Jan. 1966 154 p refs
(Contract AF 33(657)-9814)
(RTO-TDR-63-4117, Pt. II; MRB-2023F, AD-628673)

A select number of aerobic bacterial and fungal cultures (isolates from contaminated fuel tank bottoms) were screened against a variety of jet fuels (JP-4 and JP-6), a lubricant, a liquid rocket propellant, and a spectrum of pure hydrocarbons (naphthenes and normal and branched alkanes) for growth-supporting properties. Variable growth support on all jet fuel samples was noted with the exception of one which was found to contain no detectable normal alkanes. Removal of normal alkanes from the other jet fuel samples significantly reduced their growth-supporting properties. The normal alkanes supported the most growth, the 2-methyl and 2,2-dimethyl alkanes lesser growth, and the naphthenes no growth support. After the prolonged incubation of several of the bacterial cultures on the initially resistant jet fuel sample, several cultures adapted to it. A variety of jet fuel additives were also screened against bacterial cultures and certain types were found to inhibit growth. Author (TAB)

N66-24825# Harry Diamond Labs., Washington, D. C.
PROPOSED SPECIFICATION FOR AN ARTIFICIAL HEART TO BE IMPLANTED IN THE CHEST
Kennety E. Woodward 13 Jan. 1965 44 p refs
(HDL-TM-65-32; AD-619673) CFSTI: HC $2.00/MF $0.50

The proposed specification sets forth some of the requirements for an artificial heart to be implanted in the chest. Functional requirements of output pressures and flows and venous pressure and load responses are described. The hemolytic limitations believed to be adequate for indefinite pumping are stated together with the general requirements for packaging to meet the unique environment imposed on the heart. A statistical acceptance technique is proposed for determining the life and reliability of the heart prior to implantation. Feasibility of achieving certain of the proposed requirements is illustrated by experiences gained during the developing of an extracorporeal blood pump called the Army Artificial Heart Pump. The functional validity of the specification is further demonstrated by a prototype fluid-amplifier controlled artificial heart designed according to the requirements set forth herein and implanted in calves.
Author (TAB)

N66-24827# Public Health Service, Cincinnati, Ohio. Occupational Health Research and Training Facility.
CORRELATION OF OBJECTIONABILITY RATINGS OF NOISE WITH PROPOSED NOISE-ANNOYANCE MEASURES
Alexander Cohen and Richard F. Scherger May 1964 20 p refs (RR-3)

In a laboratory setting, recorded samples of roadway noise, aircraft flyover noise, and train noise were presented in a forced-choice, paired-comparison fashion to 100 listeners who judged which of the two noises in each pair was more objectionable. Such judgments yielded scaled objectionability ratings for the noise samples. These scaled ratings were correlated with A-scale sound level readings of the noises in decibels (dB), and with conversions of their physical measurements into subjective magnitudes of loudness in phon units

as computed by Stevens' and by Zwicker's techniques, and with perceived noisiness in dB as determined by Kryter's procedure. Each of these measures has been reputed to provide quantifiable estimates of noise-annoyance and did, in fact, supply values significantly correlated with the obtained scale of subjective ratings. Loudness in phons, using Zwicker's calculations, gave values which corresponded best with the scaled listener annoyance judgments (r=.96). Author

N66-24837# Joint Publications Research Service, Washington, D. C.

TECHNIQUE EMPLOYED IN IRRADIATING EXPERIMENTAL ANIMALS

R. E. Novikova 2 May 1966 14 p refs Transl. into ENGLISH from Med. Radiol. (Moscow), v. 11, no. 1, Jan. 1966 p 88–93 (JPRS-35286; TT-66-31723) CFSTI: $1.00

This article describes methods and apparatus used in irradiating experimental animals to insure the standardization of physical conditions during irradiation, the environmental moisture surrounding the irradiated animal, and methods for determining spatial distribution of radiation and of the biological material. R.N.A.

N66-24839# Joint Publications Research Service, Washington, D. C.

DEVELOPMENTS IN PROGRAMMED LEARNING AND TEACHING MACHINES

L. Ivanenko et al 5 May 1966 22 p Transl. into ENGLISH from Tekhn. Molodezhi (Moscow), no. 3, 1966 p 10–13 (JPRS-35357; TT-66-31793) CFSTI: $1.00

This paper contains several brief articles concerned with Soviet developments in programmed learning and teaching machines. Included are articles on the lack of progressive education, teaching machines and individual progress, automated questioning sessions, the Tutor-2 teaching machine, tape recorder with student response and pause signal, teaching machine for music students, and technology, school, and Communism. R.N.A.

N66-24842*# Miami Univ., Coral Gables, Fla. Inst. of Molecular Evolution.

THE TERRESTRIAL ORIGINS OF MACROMOLECULES AND OF CELLS

Sidney W. Fox [1965] 41 p refs Presented at the Colloq. on Elementary Biol. Systems and Abiogenesis, Paris, 24–25 Nov. 1965 *Its* Contrib. No. 056

(Grants NsG-173-62; NsG-689)

(NASA-CR-74819) CFSTI: HC $2.00/MF $0.50 CSCL 06A

This article describes molecular evolution studies concerned with the origin of biopolymers in the absence of cells and the chemist, and the spontaneous conversion of the polyamino acid type of such polymers into cells. Experiments are discussed which show how moderately controlled heating of alpha-amino acids, either in the laboratory or in the geological matrix, can yield a polymer which, by simple contact with water, will easily organize itself into a minimal kind of membranous cell having catalytic, fissile, and other activities imitating those of a true biological unit. At the interpretative level, these findings indicate some of the particular internally limited ways in which the now recognized and vexing biochemical and cytological complexity could begin to arise by simple processes. Experimental studies since 1959 have demonstrated how abiotic matter can organize itself into a cell if that matter is also of the appropriate origin and molecular structure. R.N.A.

N66-24854# Bureau of Ships, Washington, D. C.

DIAGNOSIS AND THERAPY OF CAISSON DISEASE [SENSUI-BYO NO SHINRYO (DAI 2 HO)] Report No. 2

Kiyohide Hida, Kakutaro Niida, and Kenji Hori Nov. 1965 26 p Transl. into ENGLISH from Kyosai Iho (Tokyo), v. 13, no. 4, Nov. 1964 p 21–28 *Its* Transl. No.-942

(AD-476124)

Clinical case histories of patients suffering from decompression sickness are presented. The cases include patients with one and a half to 32 years experience, and from 22 to 54 years old. The disease occurred most at 30–40 m diving depth and with three or more dives. The therapy takes into consideration the old Japanese Navy therapy charts, symptoms and other conditions. It was concluded that the most successful treatment is the recompression tank, and it recommended that the helmet not be removed before the treatment. At present two methods are being used: (1) lengthening as long as possible the period of low compression during decompression and (2) providing enough oxygen inhalation. N.E.N.

N66-24908*# National Aeronautics and Space Administration, Washington, D. C.

ELECTROCARDIOGRAPHY

H. C. Burger Dec. 1965 195 p Transl. into ENGLISH of the book "De Electrische Werking van Het Hart" 1963

(NASA-TT-F-9772) CFSTI: HC $5.00/MF $1.25 CSCL 06E

A survey of the state-of-the-art of electrocardiography is presented. The heart from the point of view of anatomy is discussed. In addition to electrocardiography, vectorcardiography, a variant on the classic concept, is considered in more detail. The instrumentation, techniques, representations, and clinical applications are covered. N.E.N.

N66-24915*# National Aeronautics and Space Administration, Washington, D. C.

USE OF INTERFERENTIAL CURRENTS IN COMBINED ANAESTHESIA IN SURGERY [PRIMENENIYE INTERFERENTSIONNYKH TOKOV V KOMBINIROVANNOM OBEZBOLIVANII PRI KHIRURGICHESKIKH OPERATSIYAKH]

M. I. Kuzin, V. D. Zaukovskiy, and V. I. Sachkov Apr. 1966 14 p refs Transl. into ENGLISH from Russian

(NASA-TT-F-10090) CFSTI: HC $1.00/MF $0.50 CSCL 06E

A method of combined electroanaesthesia, used in a number of surgical operations, with interferential currents is described. In order to choose the correct current for anaesthesia (minimal interferential currents bring light anaesthesia) the patient analgesia was determined before the operation. It is pointed out that when interferential currents are used the clinical shortcomings of the method are eliminated. D.T.

N66-24920*# National Aeronautics and Space Administration, Washington, D. C.

ON THE CONSTRUCTION OF A MATHEMATICAL MODEL OF A "BIOLOGICAL CLOCK" [KPOSTROYENIYU MATEMATICHESKOY MODELI "BIOLOGICHESKIKH CHASOV"]

B. S. Moshkov, L. Ya. Fukshanskiy, and G. I. Yuzefovich Apr. 1966 12 p refs Transl. into ENGLISH from Dokl. Akad. Nauk SSSR (Moscow), v. 167, no. 2, 1966 p 440–443

(NASA-TT-F-10107) CFSTI: HC $1.00/MF $0.50 CSCL 06P

A mathematical model of the biological clock, with analogs in living tissue and applicable to lower and higher forms of life, is described. Changes in the diurnal rhythm produced by variations in the period and type of illumination of various spectral regions are computed, based on a one-to-one correspondence of spectral composition of the radiation and time rate of change in the concentration of metabolic substances.

Results show that the biological clock has a period with a frequency stability of 99% almost independent of temperature; the rhythm is excited by red and white light and damped by infrared irradiation; the diurnal rhythm is kept constant under periodic illumination of a 24-hour period, changed basically by application of light with a period differing from 24 hours, and canceled by continuous illumination. Author

N66-24922*# National Aeronautics and Space Administration, Washington, D. C.

ECOLOGICAL AND GEOGRAPHICAL VARIABILITY OF SOIL BACTERIA

Ye. N. Mishus in Feb. 1966 312 p refs Transl. into ENGLISH of the book "Ekologo-Geograficheskaya Izmenchivost' Pochvennykh Bakteriy" Moscow, Izd. AN SSR, 1947

(NASA-TT-F-10124) CFSTI: HC $7.00/MF $1.75 CSCL 06M

Basic aspects of soil microbiology from the viewpoint of geographical ecology are reviewed, with emphasis on various subspecies of B.mycoides isolated from Russian soils of differing type (chernozem, podzol, gray soil, steppe soil, etc.) and differing geographical location. Darwin's laws for higher organisms are extended to microorganisms by proving the existence of ecological types of bacteria, regularly succeeding each other on progressing from North to South. Use of typical bacteria as indicator organisms for soil-forming processes in various climates and for determining the origin of grain and other seed material is discussed. Extensive tabular material on optimum and maximum temperature for various bacteria species, nutrient media, fermentative power for sugars, cell widths, spore size, thermal death point, etc. and photomicrographs of growth stages are included. Author

N66-24923*# National Aeronautics and Space Administration, Washington, D. C.

CONTRIBUTIONS TO THE PHYSIOLOGY OF WATER AND SODIUM CHLORIDE [BEITRAGE ZUR PHYSIOLOGIE DES WASSERS UND DES KOCHSALZES]

Otto Cohnheim, and G. Kreglinger May 1966 26 p refs Transl. into ENGLISH from Z. Physiol. Chem. (West Berlin), v. 63, 1910 p 413–431

(NASA-TT-F-10131) CFSTI: HC $2.00/MF $0.50 CSCL 06P

Results of experiments on the water and sodium chloride metabolism in human subjects, under altitude and lowland conditions, at rest and under physical exertion, are discussed, with tabulated data on excretion and retention of chlorine. Increased muscular work at high altitudes (4600 m) led to a transient hydremia, without change in hemoglobin concentration. Profuse perspiration resulted in chlorine depletion, compensated later by increased chlorine retention. Reduction in the HCl content of the gastric juice was observed. Author

N66-24944*# Naval School of Aviation Medicine, Pensacola, Fla.

SEA URCHIN MITOSIS IN HIGH MAGNETIC FIELDS

Vernon R. Reno 1 Feb. 1966 26 p refs *Its* Rept.-9

(NASA Order R-39)

(NASA-CR-74592; NAMI-954) CFSTI: HC $2.00/MF $0.50 CSCL 06F

Mitosis in sea urchin eggs was retarded following their exposure to magnetic fields higher than 70,000 gauss which had gradients greater than 4200 gauss/centimeter. The degree of retardation was correlated simultaneously to both the field strength and the field gradient. Division in fields ranging from 100,000 to a maximum of 120,000 gauss was independent of the gradient. Differences in division delay were found which may be a reflection of the differential migration of oxygen and nitrogen due to their para- and diamagnetic properties. A hypothesis is given concerning the biochemical processes affected by magnetic fields. Author

N66-24950*# Pennsylvania State Univ., University Park. Dept. of Biophysics.

PHYSICS OF CELLULAR SYNTHESIS, GROWTH AND DIVISION Progress Report, 1 Oct. 1965–31 Mar. 1966

Ernest C. Pollard 26 Apr. 1966 12 p refs

(Grant NsG-324)

(NASA-CR-74755) CFSTI: HC $1.00/MF $0.50 CSCL 06R

Work concerned with the synthesis, growth, division, structure, and function of the bacterial cell is reported. In studies of the nature of the effect of an irradiated medium on cells, recent work suggests that hydrogen peroxide is generated in the medium which interferes with aerobic metabolism by reducing the ATP supply in the cell thus depleting the amino acid pool, and resulting in a shutdown of translation. In studies utilizing localized damage as a tool for elucidating the cell structure and function, fast proton bombardment experiments revealed both a fast and a slow component in DNA degradation. Other work regarding localized mutations resulting from uracil-5-H^3 decay in Escherichia coli; amino acids; and physical. chemical studies are also discussed briefly. L.S.

N66-24965*# Honeywell, Inc., Minneapolis, Minn. Systems and Research Div.

MAN SYSTEM CRITERIA FOR EXTRATERRESTRIAL SURFACE ROVING VEHICLES Interim Technical Report

R. M. Nicholson and J. E. Haaland 7 Feb. 1966 342 p refs *Its* Rept.-12504-ITR1

(Contract NAS8-20006)

(NASA-CR-74743) CFSTI: HC $7.00/MF $1.75 CSCL 05H

A broad study in which the objectives were (1) to develop minimum and optimum cabin free volume design criteria for extraterrestrial surface roving vehicles and systems, (2) to define the equipments and cabin volumes associated with the crew's sleeping requirements, and (3) to define the procedural and volumetric requirements associated with emergency operation of the system is presented. Areas discussed include airlock simulators; crew tasks and task measures; sizing tests; rescue mission tests; and environmental control system failure tests. Numerous observations are made, and data curves, other types of illustrative graphs, data tables, and photographs are given. L.S.

N66-24987*# Naval School of Aviation Medicine, Pensacola, Fla.

THE THOUSAND AVIATOR STUDY: DISTRIBUTIONS AND INTERCORRELATIONS OF SELECTED VARIABLES

Albert Oberman, Norman E. Lane, Robert E. Mitchell, and Ashton Graybiel 1 Sep. 1965 221 p refs Joint Rept. with Public Health Serv. and NASA *Its* Monograph 12

(NASA Order R-136)

(NASA-CR-74710) CFSTI: HC $6.00/MF $1.25 CSCL 06N

This report describes in detail the distribution and intercorrelations of 100 variables selected from the measures obtained during the 1963 follow-up examination in the Pensacola thousand aviator study. During the 1963 examination, a large body of physiological, psychological, and personal history data was collected on 675 surviving members of the original population. Because of the magnitude and diversity of this information, an over-all view of distributions and interrelationships was necessary for (1) providing assistance in understanding the findings of the study, and (2) indicating possible areas of further research by facilitating the discovery of relationships not otherwise apparent. Data are presented

in the form of descriptive statistics, frequency histograms, and Pearson correlation coefficients. Comments deal exclusively with statistical considerations, and no interpretations are attempted. C.T.C.

N66-24988*# Public Health Service, Cincinnati, Ohio. Robert A. Taft Sanitary Engineering Center.
ECOLOGY AND THERMAL INACTIVATION OF MICROBES IN AND ON INTERPLANETARY SPACE VEHICLE COMPONENTS Fourth Quarterly Progress Report, Jan. 1–Mar. 31, 1966
Robert Angelotti Apr. 1966 26 p ref
(NASA Order R-36-015-001)
(NASA-CR-74711) CFSTI: HC $2.00/MF $0.50 CSCL 06M

The thermal resistance of *Bacillus globigii* spores dried on paper strips and encapsulated in Lucite rods has been determined at a dry heat exposure temperature of 125°C. The $D_{125°C}$ value for these spores dried on paper strips was found to be 1.72 hours with a 95% confidence interval of 1.61 to 1.83 hours. In duplicate experiments performed with these spores encapsulated in Lucite, the $D_{125°C}$ values were: experiment 1, 3.08 hours, 95% confidence interval of 2.55 to 3.61 hours; experiment 2, 3.44 hours, 95% confidence interval of 2.98 to 3.89 hours. Author

N66-24991*# California Univ., Los Angeles. Space Biology Lab.
ANALYSIS OF BASELINE AND GEMINI FLIGHT GT-7 EEG DATA WITH SPECIFICATION OF ON-LINE COMPUTING REQUIREMENTS
W. R. Adey, R. T. Kado, and D. O. Walter [1965] 37 p refs
(Grant NsG-505)
(NASA-CR-74716) CFSTI: HC $2.00/MF $0.50 CSCL 06B

Evidence has been presented, from analysis of EEG data from a population of 50 astronaut candidates, of common characteristics that clearly separate a gamut of conscious and sleeping states, including concomitants of vigilance and decision-making tasks. Extensive digital computing methods for spectral analysis were used, with display techniques that are suited to medical monitoring. Computer recognition of these states by discriminant analysis has indicated the feasibility of on-line computation by special purpose flight computer, using minimal numbers of data channels, and as few as 4 variables in each channel. The essential requirements are discussed for on-line computation and display. Application of these techniques to EEG data from Gemini Flight* GT-7 are discussed. The analyses emphasize the value of the EEG in detection of both slow and rapid shifts in states of sleep and wakefulness beyond levels that can be detected by observations of EKG and/or respiration. Author

N66-25039# Sandia Corp., Albuquerque, N. Mex. Aerospace Nuclear Safety Div.
AERO HEATING RESULTS FROM THE RFD-2 FLIGHT TEST
A. J. Clark, Jr. 8 Oct. 1965 16 p Presented at the 13th Conf. on Remote Systems Technol., Washington
(Contract AT(29-1)-789)
(SC-DC-65-1601; CONF-651101-37) CFSTI: HC $1.00/MF $0.50

The Re-entry Flight Demonstration No. 2 test was conducted to study the response of the isotopic generator during the re-entry portion of the flight. The primary objective of this flight test was to study generator disassembly and fuel capsule burnup as a result of re-entry heating. Data obtained by thermocouple measurements are presented. NSA

N66-25084# Sandia Corp., Albuquerque, N. Mex.
HEALTH HAZARDS FROM SELENIUM RECTIFIERS
John P. Grillo [1964] 13 p refs Presented at the Rocky Mountain Sec., Am. Ind. Hygiene Assoc. Meeting, Albuquerque, N. Mex.
(Contract AT(29-1)-789)
(SC-DC-65-1790; CONF-651037-1) CFSTI: HC $1.00/MF $0.50

Hazards from selenium fume as a result of rectifier arc-over are discussed and data and specific examples are included. Methods for determining the amount of selenium exposure in the event of accidents are suggested. NSA

N66-25116# Institute for Cancer Research, Philadelphia, Pa.
STUDIES OF THE EFFECTS OF ULTRAVIOLET RADIATION ON CELL STRUCTURE AND BEHAVIOR Annual Progress Report, Nov. 1964–Nov. 1965
Jerome J. Freed 20 Dec. 1965 28 p refs
(Contract AT(30-1)-2356)
(TID-22493) CFSTI: HC $2.00/MF $0.50

Motile activity of cultured cells was studied with special emphasis on the saltatory motion of cytoplasmic organelles. The results suggest the presence of a system of microtubules distributed throughout the cell cytoplasm, in connection with which rapid particle movements take place. At the same time, uv cytophotometric analyses of living cells were continued, using the vibrating mirror flying spot microscope to measure changes in absorbancy during normal interphase growth and to follow the kinetics of absorbancy decrease after actinomycin blockade of RNA synthesis. The effects on cell multiplication and behavior of a protein fraction from differentiated cells were tested; these proteins are believed to play a role in dye-induced carcinogenesis, and had been postulated to have a repressor-like activity. The experiments demonstrated the inhibitory nature of this protein fraction. Genetic studies of haploid frog cells, resulted in development of a satisfactory cloning technique and other procedures required for isolation of mutants. Author (NSA)

N66-25147# Naval Medical Research Inst., Bethesda, Md.
SUMMARIES OF RESEARCH
D. Minard et al 1964 41 p refs

A summary of the research activities for the year 1964 is presented. Included are abstracts/or summaries of research reports in the areas of: Environmental Stresses, Nutritional Biochemistry, Biophysics, Chemistry, Experimental Surgery, Molecular Energetics, Physical Biochemistry, Protozoology, Parasitology, Intracellular Microbiology, Pathobiology, Medical Entomology, Helminthology, Behavioral Sciences, and Dental Research. H.S.W.

N66-25151# Joint Publications Research Service, Washington, D. C.
PHYSIOLOGICAL RESEARCH
I. M. Alekseyeva et al 26 Apr. 1966 27 p refs Transl. into ENGLISH from Fiziol. Zh. (Kiev), v. 12, no. 1, Jan.–Feb. 1966 p 56–68
(JPRS-35187; TT-66-31624) CFSTI: HC $1.00

CONTENTS:

1. EFFECT OF TRANSFUSION OF THE PROTEIN BLOOD SUBSTITUTE BK-8 ON THE PROTEIN COMPOSITION OF THE BLOOD SERUM IN OLD ANIMALS I. M. Alekseyeva p 1–11 refs

2. CHANGE IN THE BIOPHYSICAL PARAMETERS OF THE PROTOPLASM'S SURFACE LAYER OF MOLLUSC NEUTRONS INDUCED BY IONIZING RADIATION V. I. Bogomolets and V. A. Mayskiy p 12–21 refs

N66-25155# Aeronautical Center, Oklahoma City, Okla. Office of Aviation Medicine.

PHASE SHIFTS OF THE HUMAN CIRCADIAN SYSTEM AND PERFORMANCE DEFICIT DURING THE PERIODS OF TRANSITION: I. EAST-WEST FLIGHT

G. T. Hauty and T. Adams Dec. 1965 19 p refs (AM-65-28)

At periodic intervals throughout the biological day, biomedical assessments were made for a week prior to jet flight to Manila, for 8 days of layover at Manila, and for a week following return. The rapid translocation effected primary phase shifts as follows: for rectal temperature and heart rate, 4 days; for palmar evaporative water loss, 8 days. The return flight effected a 1-day phase shift. Behavioral integrity was degraded, although to a lesser extent after return. Duration of behavioral impairment was much shorter than the lag time of physiological phase shifts. Author

N66-25166# Bureau of Mines, Pittsburgh, Pa.

RESPIRATORY PROTECTIVE DEVICES APPROVED BY THE BUREAU OF MINES AS OF OCTOBER 1, 1965

R. H. Schutz, B. I. Ferber, and E. J. Kloos 1966 32 p refs (BM-IC-8281) GPO: $0.25

This report lists all active respiratory protective devices that have been approved by the Bureau of Mines as of October 1, 1965. These devices include self-contained breathing apparatus, gas masks, supplied air respirators, dispersoid (dust, fume, and mist) respirators, and nonemergency gas respirators. These devices are currently manufactured and sold, and are listed with the manufacturer's current designation. Inactive devices, listed in appendix A, are no longer manufactured but retain their approved status. The addresses of the manufacturers of approved active respirators are listed alphabetically in appendix B. R.N.A.

N66-25172# Joint Publications Research Service, Washington, D. C.

METHODS OF STUDYING INDUSTRIAL DUST AND THE INCIDENCE OF PNEUMOCONIOSES

A. A. Letavet and Ye. V. Khukhrina, ed. 11 Mar. 1966 116 p refs Transl. into ENGLISH of the book "Metody Izucheniya Proizvodstvennoy Pyli i Zabolevayemosti Pnevmokoniozami" Leningrad, Med. Publishing House, 1965 p 1-123 (JPRS-34512; TT-66-30952) CFSTI: $4.00

CONTENTS:

1. EVALUATION OF THE MODERN METHODS OF DETERMINATION OF THE AMOUNT AND DISPERSITY OF DUST Ye. V. Khukhrina p 5-9

2. METHODS OF DETERMINATION OF THE DEGREE OF CONTAMINATION OF AIR WITH DUST USING AEROSOL ANALYTICAL FILTERS (AAF) A. I. Vronskiy and V. B. Latushkina p 9-17 refs

3. INVESTIGATION OF THE DUST CONTENT OF AIR BY THE ULTRAMICROSCOPY METHOD I. A. Kovalevich p 17-22 refs

4. COMPARATIVE EVALUATION OF NEW METHOD OF DETERMINATION OF THE DUST CONTENT OF AIR A. I. Vronskiy, A. S. Slutsker, and Ye. V. Khukhrina p 22-32 refs

5. COMPARATIVE EVALUATION OF TWO GRAVIMETRIC METHODS OF DETERMINATION OF DUST CONCENTRATION IN MINE AIR Ya. Shimechek, V. V. Tkachev, and A. M. Shevchenko p 33-38 refs

6. STUDY OF THE PARTICLE SIZE DISTRIBUTION OF DUST BY THE MICROSCOPY METHOD T. T. Lobova p 39-43

7. APPARATUS FOR THE MICROSEDIMENTATION ANALYSIS OF PARTICLE SIZE DISTRIBUTION OF DUST A. I. Vronskiy p 43-48 refs

8. ON THE DETERMINATION OF THE DEGREE OF DISPERSION OF WATER FOG K. A. Galkina and A. S. Slutsker p 49-52 refs

9. METHODS OF DETERMINATION OF FREE SILICON DIOXIDE IN DUST V. I. Kireyev p 52-60 refs

10. THE COUNTING-COLOR METHOD OF DETERMINATION OF THE MINERAL COMPOSITION OF DUST P. I. Tyutin p 60-66 refs

11. PROCEDURE FOR INVESTIGATION OF THE EFFICIENCY OF DUST-ABATEMENT EXHAUST SYSTEMS V. G. Matsak and A. S. Slutsker p 66-96 refs

12. METHODS OF THE STUDY OF OCCURRENCE OF PNEUMOCONIOSES Ye. V. Khukhrina and N. V. Dogle p 97-107

N66-25183# Joint Publications Research Service, Washington, D. C.

THE CENTRAL IDEAS AND PHILOSOPHICAL PRINCIPLES OF CYBERNETICS

V. D. Moiseyev 21 Apr. 1966 239 p refs Transl. into ENGLISH of the book "Tsentral'nyye Idei i Filosovskiye Osnovy Kibernetiki" Moscow, "Mysl" Publishing House, 1965 p 1-326 (JPRS-35136; TT-66-31573) CFSTI: $6.00

This work is an attempt to summarize and systematize the central ideas and philosophical principles of cybernetics. Included are sources, main concepts, and certain philosophical questions concerning cybernetics; ideas on feedback mechanisms in living and inanimate self-controlled systems; ideas about information in living and inanimate self-controlled systems; and ideas on automatic computers as machines of a special type capable of executing functions analogous to human thought. R.N.A.

N66-25185# Federal Aviation Agency, Washington, D. C. Office of Aviation Medicine.

ANTHROPOMETRY OF AIR TRAFFIC CONTROL TRAINEES

Clyde C. Snow and Richard G. Snyder Sep. 1965 33 p refs (AM-65-26)

This report presents the body measurements of 684 air traffic control trainees enrolled in training programs conducted at the Federal Aviation Agency Aeronautical Center at Oklahoma City between August 12, 1960, and June 30, 1961. It includes the means, standard deviations, coefficients of variation, percentiles, and related statistics of 60 standard anthropometric and functional measurements. The survey was initiated to provide adequate criteria for improving the workspace design for the air traffic controller and to provide anthropometric baseline data for future biometric and aging studies of Air Traffic Service personnel. Author

N66-25202# Joint Publications Research Service, Washington, D. C.

SOVIET HYPODYNAMIA EXPERIMENT

Levon Agayan, Igor Grigor'yev, Toriy Mashkevich, and Konstantin Nikitenko 28 Dec. 1965 21 p Transl. into ENGLISH from Znaniye Sila (Moscow), no. 10, Oct. 1965 p 6-9 (JPRS-33504; TT-65-34078) CFSTI: $1.00

A description is given of a hypodynamia experiment which was conducted in a simulated 10-day space mission. This includes descriptions of the internal sensations of the experimenters and all the conditions under which the experiment

was conducted. Preliminary conclusions are that motor coordination was disturbed, and that there was a partial drop in muscular strength, endurance, and mental and physical efficiency. The relationships of morphologic structures in the organism were influenced; the muscular mass decreased somewhat and there was a noticeable increase of fatty tissue. C.T.C.

N66-25205# Joint Publications Research Service, Washington, D. C.
APPLICATION OF PHILOSOPHY TO BIOLOGY AND GAME THEORY
26 Apr. 1966 41 p refs Transl. into ENGLISH from Vopr. Filosofii (Moscow), no. 1, 1966 p 65–74, 148–150, 93–103 (JPRS-35191; TT-66-31628) CFSTI: $2.00

CONTENTS:
1. PHILOSOPHICAL PROBLEMS OF MOLECULAR BIOLOGY R. S. Karpinskaya p 1–14 refs
2. CONFERENCE ON PHILOSOPHICAL PROBLEMS OF CONTEMPORARY BIOLOGY V. P. Chekurin p 15–19
3. SOME METHODOLOGICAL PROBLEMS OF GAME THEORY N. N. Vorob'yev p 20–34 refs

N66-25223# Battelle-Northwest, Richland, Wash.
HANFORD BIOLOGY RESEARCH Annual Report No. 14, 1964
R. C. Thompson and S. W. Woods, ed. Jan. 1965 268 p refs (Contract AT(45-1)-1830)
(BNWL-122) CFSTI: HC $6.00/MF $1.25

Biological research activities concerned with radioelements are reported. Radioelement toxicity, metabolism, deposition, and response were investigated, along with studies in animal, cellular, and plant physiology, and ecology. Chronic and biological effects of inhaled $Pu^{239}O_2$, Sr^{90}, I^{131}, Ce^{144}–Pr^{144}, Ru^{107}–Rh^{106}, Cs^{137}, Pm^{147}, Zn^{65}, Np^{237}, and other radioelements on various animals, and the biological effects of these elements on the animal organs were studied. Other work is discussed regarding bile salt absorption from an irradiated rat intestine; the influence of fission neutrons on rat reproduction; DDT toxicity in flour beetles; the synthesis of RNA in Escherichia coli; the role of indole pyruvic acid in the metabolism of trytophan in Neurospora; the incorporation of Acetate-1-C^{14} into long-chain fatty acids by lung Mitochondria; the absorption and translocation of Rb^+ and I^- by intact plants; and the effects of moisture and air temperature on deposition and retention of I_2^{131} on plants and soil. Other research activities regarding ecological systems are also discussed. L.S.

N66-25232# California Univ., Los Angeles. Lab. of Nuclear Medicine and Radiation Biology.
INTERCEPTION AND RETENTION OF RADIOACTIVE FALLOUT BY DESERT SHRUBS IN THE SEDAN FALLOUT FIELD Final Report
William E. Martin 10 Dec. 1965 47 p refs
(Contract AT(04-1)-GEN-12; Proj. Sedan)
(PNE-238F) CFSTI: HC $2.00/MF $0.50

Concentrations of ^{131}I and ^{89}Sr on plants contaminated by fallout from Project Sedan tended to decrease with increasing distance from ground zero and increasing time after the detonation. Microscopic and radiometric examinations of foilage indicated that most of the activity deposited on leaves was probably due to particles $<5\ \mu$ in diameter. A comparison between the theoretical and observed interrelations of gamma dose rates, ^{131}I and ^{89}Sr deposition rates, and ^{131}I and ^{89}Sr interception by desert shrubs indicated a deficiency of ^{131}I relative to ^{89}Sr in areas more than 40 miles from ground zero and an excess of both ^{131}I and ^{89}Sr relative to dose rates in areas about 100 miles from ground zero. Statistical analyses indicated that the frequency distributions of variates representing maximum concentrations of ^{131}I and ^{89}Sr on plants, and in the tissues of rabbits collected at the same times and locations in the fallout field, were not normal but lognormal. Similar analyses indicated that the frequency distributions of effective half life estimates could be treated as either normal or lognormal. NSA

N66-25281# RAND Corp., Santa Monica, Calif.
A DIFFUSION-EQUATION MODEL FOR NEURON FIRING WITH EXPONENTIAL DECAY OF POTENTIAL
Brian Gluss Mar. 1966 31 p
(Grant NIH GM-09608)
(RM-4857-RC)

A neuron is assumed to receive synaptic input of both excitatory and inhibitory natures from a large number of neighboring neurons; it is also assumed that a large number of such impulses are required to raise the neuron's transmembrane potential to its threshold potential, at which it fires. The model is an extension of the Gerstein and Mandelbrot model, in which, in the absence of input, an exponential decay of potential toward a resting level is introduced. Computational methods of determining the firing time interval distribution are discussed, along with the inverse problem of estimating the parameters of the system from observed firing time interval data. These parameters are: the restoration potential following a firing; threshold potential; absolute refractory period; resting potential level; and the statistical properties of the excitatory and inhibitory impulses. D.T.

N66-25285# Joint Publications Research Service, Washington, D. C.
APPLICATION OF BIONICS TO THE FIELD OF STANDARDIZATION
13 May 1966 15 p Transl. into ENGLISH from Standarty i Kachestvo (Moscow), no. 1, 1966 p 42–45
(JPRS-35502; TT-66-31938) CFSTI: $1.00

The importance of bionics in modern technology, in general, and in the field of standardization, in particular, is discussed in an editorial. A narrative account is given, describing existing and proposed machines for simulating and utilizing biological and physiological processes. Finally, a second narrative account is devoted to the establishment of mutual ties among bionics, standardization, and technical esthetics. D.T.

N66-25296# Joint Publications Research Service, Washington, D. C.
DIARY OF A PILOT-COSMONAUT
N. S. Khekhlovskaya, ed. 5 Jun. 1964 47 p Transl. into ENGLISH of the Booklet "Dnevnik Letchika-Kosmonavta K." "Sov. Rossiya" Publishing House, 1963 p 1–78
(JPRS-24973; OTS-64-31430) CFSTI: $1.25

This article presents the diary of a Soviet pilot-cosmonaut and includes his comments on space flight, the Soviet space program accomplishments, and the day to day activities of the cosmonaut training program. R.N.A.

N66-25302# Joint Publications Research Service, Washington, D.C.
PHYSIOLOGICAL, ACOUSTIC, AND CARDIAC STUDIES BASED ON COSMONAUT EXPERIENCE
2 May 1966 65 p refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR, Ser. Biol. (Moscow), no. 1, Jan.–Feb. 1966 p 3–35
(JPRS-35278; TT-66-31715) CFSTI: $3.00

Several Soviet studies in aerospace medicine and biology are presented. They include physiological responses of cosmonauts in support-free space, problems in developing an

optimum acoustic environment in spacecraft cabins, changes in the cardiac activity and respiration of cosmonauts during the orbital flight of Voskhod 1, and vestibular reaction of the deaf upon exposure to angular and coriolis accelerations. R.N.A.

N66-25306*# National Aeronautics and Space Administration, Washington, D. C.
AEROSPACE MEDICINE AND BIOLOGY—A CONTINUING BIBLIOGRAPHY, MARCH 1966
Apr. 1966 143 p refs
(NASA-SP-7011(23)) CFSTI: HC $4.00/MF $1.00 CSCL 06

An annotated bibliography is presented on aerospace medicine and biology. The subject coverage concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the earth's atmosphere or in interplanetary space. Also included are references describing similar effects on biological organisms of lower order, and related topics such as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors. R.N.A.

N66-25312# Joint Publications Research Service, Washington, D. C.
THEORY AND PRACTICE OF PROGRAMMED INSTRUCTION
L. T. Pesochina et al 19 Nov. 1965 13 p Transl. into ENGLISH from Vestn. Vysshey Shkoly (Moscow), no. 3, Mar. 1965 p 19–24
(JPRS-32942; TT-65-33519) CFSTI: $1.00

CONTENTS:
1. SUPERVISION OVER STUDIES ON RESISTANCE OF MATERIALS WITHOUT USING MACHINES L. T. Pesochina, G. A. Mirze, and M. K. Molochnikova p 1–5
2. SCIENTISTS DISCUSS THE METHODS OF PROGRAMMED INSTRUCTION G. S. Tsov'yanov p 6–9

N66-25317# Joint Publications Research Service, Washington, D. C.
STUDIES IN MENTAL TELEPATHY
Leonid Leonidovich Vasil'yev 12 May 1966 148 p refs Transl. into ENGLISH of the book "Vnusheniye Na Rasstoyanii (Zametki Fizioloqa)" Moscow, Gospolitizdat., 1962 p 1–160
(JPRS-35467; TT-66-31903) CFSTI: $4.00

CONTENTS:
1. HISTORY OF THE MATTER AND BASIC CONCEPTS p 3–14 refs
2. CASES FROM DAILY LIFE CONSIDERED AS SUGGESTIONS AT A DISTANCE p 15–26 refs
3. EXPERIMENTAL ESTABLISHMENT OF SUGGESTION AT A DISTANCE p 27–40 refs
4. A COMPARISON BETWEEN CASES IN LIFE AND EXPERIMENTAL RESULTS p 41–46 refs
5. LOOKING FOR BEST EXPERIMENTAL CONDITIONS p 47–59 refs
6. TELEPATHIC COMMUNICATION p 60–67 refs
7. THE GIFT OF TELEPATHY p 68–80 refs
8. THE PHYSIOLOGICAL STUDY OF SUGGESTIONS AT A DISTANCE p 81–94 refs
9. THE PHENOMENON OF "BIOLOGICAL TELECOMMUNICATION" IN ANIMALS p 95–103 refs
10. THE ELECTROMAGNETIC HYPOTHESIS OF SUGGESTION AT A DISTANCE p 104–117 refs
11. EXPERIMENTS AT A VERY GREAT DISTANCE p 118–129 refs
12. THEORETICAL SIGNIFICANCE AND POSSIBLE PRACTICAL APPLICATION p 130–141 refs

N66-25341# Institute of Cancer Research. Royal Cancer Hospital, London (England). Chester Beatty Research Inst.
TISSUE THERAPY AFTER IRRADIATION
P. C. Koller [1964] 11 p refs
(Contracts IAEA-103/3/US); AT(30-1)-2702)
(TID-21799) CFSTI: HC $1.00/MF $0.50

Progress is reported in studies of the effects of radiation dose and the injection of various types and numbers of hematopoietic cells on recovery of mice from doses of 300, 500, and 700 R x radiation; a comparison of methods of preserving hematopoietic cells; the effects of removal of the thymus on immune reactions in irradiated mice; the effects of irradiation on pre-existing immunity in mice; the effectiveness of thymus grafts in restoring immunological competence to neonatally thymectomized mice; and the effects of thymus grafts on the life span of irradiated mice injected with foreign bone marrow. A list is included of 18 publications during the period covered by this report. NSA

N66-25471# Albert-Ludwigs-Universität, Freiburg (West Germany). Medzinischen Klinik.
THE DIAGNOSIS OF DELAYED RADIATION DAMAGE TO THE HEMATOPOIETIC ORGANS FOLLOWING CHRONIC OCCUPATIONAL RADIATION EXPOSURE [ZUR DIAGNOSE VON STRAHLENSPATSCHADEN DER HAEMOPOETISCHEN ORGANE INFOLGE BERUFLICH BEDINGTER CHRONISCHER STRAHLENBELASTUNG]
F. Wendt and A. Preussler Brussels, EURATOM, Mar. 1966 114 p refs In GERMAN; ENGLISH summary
(Contract EURATOM-031-64-1 BIAD)
(EUR-2634.d) CFSTI: HC $4.00/MF $0.75

The effects of radiation on 13 occupationally exposed persons were investigated, by means of information from the occupational hazard insurance companies and other sources. The cases were divided into 4 groups according to the degree of damage, namely: (1) Minor reversible damage with temporarily lowered bone marrow cellularity and blood cell reductions (7 cases). (2) Medium reversible damage with longer term history of bone marrow hypoplasia and pathological blood cell values (1 case). (3) Severe irreversible damage with persistent bone marrow hypoplasia and pathological blood cell values (1 case). (4) Malignant hemoblastosis or other forms of neoplastic bone marrow disease. The probability was established that the effect of radiation was an essential pathogenetic factor in 4 cases: a reticulosarcomatosis, a subacute myeloblastic leukemia, a subacute lymphatic leukemia, and a lymphatic leukemia with transition to a reticulosarcomatosis. No unequivocally radiation-specific alterations were found. The diagnosis of radiation-induced damage to the hematopoietic organs from small radiation doses, such as occur in occupational exposure, can be made with adequate probability only after detailed and comprehensive investigation, and only from the totality of all unspecific symptoms. In this context a special significance is attached to exposure anamnesis, the subjective data of which must be supplemented by as accurate an individual dosimetry as possible. Author

N66-25526*# Public Health Service, Phoenix, Ariz. Communicable Disease Center.
LABORATORY FOR MONITORING BACTERIAL CONTAMINATION OF SPACE COMPONENTS Quarterly Report, Jan.–Mar. 1966
Apr. 1966 8 p *Its* Rept.-12
(NASA Order R-137)
(NASA-CR-74868) CFSTI: HC $1.00/MF $0.50 CSCL 06T

Studies relating to the recovery of microorganisms from solids are continuing, and the effect of various organic solvents on the viability of spores of *B. subtilis* var. *niger* was studied in an attempt to design a model system in which spores could be recovered quantitatively from plastic materials. Ethylene diamine was found to be extremely toxic to spores, but benzene, chloroform, freon, and several other solvents appear to be usable for recovering spores from suitable solids. The development of an efficient and reliable technique for removing microbial contaminants from surfaces was also studied, as was the survival of microorganisms on stainless steel surfaces and polystyrene granules. Other studies reported in brief deal with the comparison of levels and types of microbial contamination in industrial clean rooms and hospital operating rooms, recovery of sublethally heat-damaged aerobic and anaerobic spores, and microbial contamination from handling and fallout. M.W.R.

N66-25534# Joint Publications Research Service, Washington, D. C.
SOME PROBLEMS RELATING TO THE MECHANISM OF THE TOXIC EFFECT OF CARBON TETRACHLORIDE AND ITS HOMOLOGS
P. G. Garkavi 8 Apr. 1966 24 p refs Transl. into ENGLISH from Farmakol. i Toksikol. (Moscow), v. 29, no. 1, Jan.–Feb. 1966 p 118–124
(JPRS-34975; TT-66-31413) CFSTI: $1.00

A review of the literature points to the hepatotropic character of the toxic effect of carbon tetrachloride and its homologs. Experimental data relating to enzyme activity in blood serum, the make-up of blood and urine, and disruption of liver metabolism are cited. Suggestions offered to explain the toxicity of CCl_4 include: (1) the structural disorganization of the mitochondria disrupt enzyme metabolism; (2) enzyme disruption is connected with the utilization of energy rather than its production; (3) fatty dystrophy of the liver results from lack of glycogen, the accumulation of triglycerides, or disruption in lipoprotein formation; (4) sulfahydryl groups are blocked out; or (5) protein synthesis is inhibited.
M.W.R.

N66-25548*# Spacelabs, Inc., Van Nuys, Calif.
DRY ELECTRODES FOR PHYSIOLOGICAL MONITORING
Charles W. Patten, Frank B. Ramme, and James A. Roman (NASA. Flight Res. Center) Washington, NASA, May 1966 40 p ref
(Contracts NAS4-390; NAS4-791)
(NASA-TN-D-3414) CFSTI: HC $2.00/MF $0.50 CSCL 06B

A method for very rapid application of electrocardiogram electrodes by spraying a conductive mixture is described. The electrodes are also suitable for electroencephalograms. All required equipment and the application procedure are described in detail. The finished electrode is dry and is less than 0.01-inch thick. Electrical and operational factors are not considered. Author

N66-25560*# Spacelabs, Inc., Van Nuys, Calif.
X-15 DATA DISPLAY SYSTEM
Washington, NASA, May 1966 83 p
(Contract NAS4-589)
(NASA-CR-460) CFSTI: HC $5.00/MF $0.75 CSCL 06B

Advanced signal processing techniques for the data display system were studied. The general procedure was conversion of flight data (physiological and environmental parameters of interest to the medical monitor) to digital form, the digital process programming, testing and debugging, and interpretation of application run results. Details are given on the electrocardiogram (ECG), autocorrelation, ECG digital filtering, spectral ECG analysis, digital synthetic ECG waveform generation, ECG waveform averaging, respiration signal processing, and Korotkow sound signal processing. Certain trouble areas such as waveform distortion, unreliable performance of bandpass filtering, and waveform averaging difficulties are discussed. It was felt that the techniques have not received sufficient reliability or economy to warrant implementation into an operational system. Areas of work needing further study are indicated. N.E.N.

N66-25565*# CBS Labs., Stamford, Conn.
DEVELOPMENT OF AN ELECTRONIC DUMMY FOR ACOUSTICAL TESTING (INCORPORATING MANUAL OF OPERATION AND DESIGN) Final Report, Jun. 1965–Feb. 1966
28 Mar. 1966 93 p
(Contract NAS9-4414)
(NASA-CR-65348; CLD-1760) CFSTI: HC $3.00/MF $0.75 CSCL 06B

The electronic dummy provides an exact replica of an average male torso from the xiphoid process upward, including the simulation of natural flesh impedances, an artificial voice, and a highly advanced artificial ear. The fabrication methods are summarized, and the details of the construction, testing, and characteristics of the aural and voice simulators are reviewed. An instruction manual for operation and maintenance is included. The theory of operation and the operational processes are discussed, and a typical measuring procedure is outlined. The test equipment and the methods for calibrating and aligning the components are designated. Instructions are given for disassembly and reassembly.
N.E.N.

N66-25578*# National Aeronautics and Space Administration, Washington, D. C.
AEROSPACE MEDICINE AND BIOLOGY A Cumulative Index to the 1965 Issues of a Continuing Bibliography
April 1966 725 p refs
(NASA-SP-7011 (20)) CFSTI: HC $7.00/MF $3.50 CSCL 06E

Cumulative subject, corporate source, and author indexes are presented for the aerospace medicine and biology continuing bibliography. The subject index contains "see" and "see also" cross references. D.T.

N66-25581*# LTV Aerospace Corp., Dallas, Tex. Astronautics Div.
UNMANNED EXTRAVEHICULAR ENVIRONMENTS OPERATION QUALIFICATION TEST OF THE GEMINI EXTRAVEHICULAR SUPPORT PACKAGE AND EXTENDED UMBILICAL Test Plan
B. W. Tyler 24 Nov. 1965 58 p refs *Its* Rept.-00.724
(Contract NAS9-3414)
(NASA-CR-65357) CFSTI: HC $3.00/MF $0.50 CSCL 06K

The test plan is presented which describes the unmanned portion of the extravehicular environments operation qualification test program for the Gemini extravehicular support package (ESP) and the extended umbilical. The test program is designed to qualify the ESP and extended umbilical for proper operation in the space environment, and includes two unmanned tests of the ESP during simulated Gemini near earth day and night orbital conditions. The ESP will be attached to a thermal dummy wearing a Gemini extravehicular suit assembly. During pump down and stabilization, the suit and extended umbilical are to be controlled with infrared lamps and the earth thermal. Depletion of the ESP oxygen bottle is to be accomplished by venting the oxygen outside

the chamber through a flowmeter and an adjustable control valve. The temperature, pressure, and solar radiation parameters of the simulated conditions are given, and the data processing and check lists are included. N.E.N.

N56-25582*# Hamilton Standard Div., United Aircraft Corp., Windsor Locks, Conn.

MSC AIR EVAPORATION WATER RECLAMATION SYSTEM. Final Report

H. Kolnsberg 11 Aug. 1965 69 p refs

(Contract NAS9-3796)

(NASA-CR-65345) CFSTI: HC $3.00/MF $0.75 CSCL 06K

An automatic air evaporation processing system for the reclamation of potable water from urine was designed and constructed. System operation and performance in both preliminary and acceptance testing are discussed. The test results show that the product water possesses no objectionable color, odor, or taste and contains only trace impurities well below the limits established by the United States Public Health Service for drinking water. It is noted that while the system has been designed for zero gravity operation, the evaporating wick remains gravity dependent and will not necessarily perform properly in all attitudes in a gravity field; all other components, however, are gravity independent. D.T.

N66-25606# Naval Radiological Defense Lab., San Francisco, Calif.

THE INCORPORATION OF TRITIUM FROM THYMIDINE INTO PROTEINS OF THE MOUSE

Bernard J. Bryant 21 Jan. 1966 26 p refs Work done in part at Brookhaven Natl. Lab.

(USNRDL-TR-971; AD-630331) CFSTI: HC $2.60/MF $0.50

Tritium from methyl-3H-Thymidine was found to be incorporated into proteins in mice. This incorporation in the mouse as a whole represented between 1 and 10% of the injected tritium. Triatiated water was not responsible for the labeling. Transmethylation reactions were proposed as a means whereby certain amino acids might have acquired the tritium from thymidine at some stage of its catabolysis. The initial (2-hour) ratios of DNA to protein tritium activities per mg wet tissue ranged from 5 in two tissues of low DNA synthetic activity (pancreas, liver) to 35–40 in two tissues of high DNA synthetic activity (speen, small intestine). Labeled nuclear protein was coincident with labeled DNA in nuclei, where it constituted less than 2.5% of the total tritium. The significance of the findings was discussed. Author (TAB)

N66-25609# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

THEORY AND PRACTICE OF IONIZED-AIR THERAPY

L. L. Vasil'yev 6 Jan. 1966 144 p refs Transl. into ENGLISH of the publ. "Teoriya i Praktika Lecheniya Ionizirovannym Vozdukhom" Leningrad, Izd. Leningr. Gos. Univ., 1951 132 p (FTD-TT-65-590/1+2; TT-66-60830; AD-630415) CFSTI: HC $14.60/MF $1.00

Contents: Natural ionization of air, its climatological and hygienic significance; Artificial ionization of air, aeroion generators and counters; Therapeutic use of aeroionization (aeroiontherapy); Experimental bases of aeroiontherapy; Paths and mechanisms of the physiological effect of aeroions. TAB

N66-25618# Naval Radiological Defense Lab., San Francisco, Calif.

THE EFFECT IN STOMACH OF IONIZING RADIATION ON ACID SECRETION, POTENTIAL, ADENOSINE TRIPHOSPHATE AND PHOSPHOCREATINE IN COMPARISON TO SPLEEN

Joseph T. Cummins, Herbert H. Kohl, and Burton E. Vaughan 21 Feb. 1966 24 p refs

(USNRDL-TR-980; AD-630390) CFSTI: HC $2.60/MF $0.50

Results using an In Vitro rat stomach preparation indicate that gastric acid secretion is stimulated through neurological pathways and induced by both handling and irradiation. The changes in acid secretion occurred independently of alterations in the sodium-potassium dependent potential across the stomach. Despite the two functional radiation effects, there were no gross changes in phosphorylative metabolism in rat stomach, otherwise adenosinetriphosphate and phosphocreatine would have been affected. At the same time, there was the expected irradiation change in spleen ATP, but the spleen phosphocreatine remained unchanged. The latter is a new observation which puts in question some aspects of the current cellular theory of splenic irradiation effects. Author (TAB)

N66-25627# Aktiebolaget Atomenergi, Stockholm (Sweden).

CALCIUM AND STRONTIUM IN SWEDISH WATERS AND FISH, AND ACCUMULATION OF STRONTIUM-90

P-O Agnedal Apr. 1966 38 p refs

(AE-224) CFSTI: HC $2.00/MF $0.50

The purpose of this study has been to investigate the correlation between calcium and strontium in fish in relation to the concentration of these elements in the water. Lakes with calcium concentrations between 2–63 mg/l have been studied and samples from the Baltic coastal water are also included. Three fish species are studied, viz. pike (Esox lucius (L.)), perch (Perca fluviatilis (L.)) and roach (Leuciscus rutilus (L.)). Bones, muscle tissues, and skin + scales have been analysed. Measurements have been made showing an increase of strontium-90 in both water and fish. Calculations show that water with about 2 mg Ca/l a 10-fold increase of the existing strontium-90 level might give strontium-90 concentrations in fish muscle tissues close to what is permissible. In lakes with calcium concentrations 20–40 mg/l the permissible levels for drinking water will be exceeded before the fish consumption would have to be restricted. Author

N66-25660# Istituto Superiore di Sanita, Rome (Italy). Laboratori di Fisica.

OBSERVATIONS ON THE ULTRASTRUCTURE OF THE OZENATOUS NASAL MUCOSA

V. Casobati, F. Rosati Valente, and C. Silvagni (Rome Univ.) 5 Oct. 1965 70 p refs

(ISS-65/34) CFSTI: HC $3.00/MF $0.75

The authors have studied in the electron microscope the alterations of the nasal mucosa during the course of ozena. In the early stages the following was observed: (1) increase in the cytoplasmic digitations of the ciliated cells; (2) increase in the number of mitochondria in the basal layer; (3) appearance of wide spaces, filled with a non-mucinoid material, in the outermost layer of the epithelium; (4) increase in the number and thickness of the stomi of the vessel walls. In the advanced stages the following was observed; (a) increase in the thickness of the basement membrane and in the number of desmosomes; (b) endothelial changes in the vessels; (c) alterations of the collagen fibres; (d) appearance of mitochondrial aggregates in the basal layer of the epithelium; (e) changes in the Golgi apparatus in the muciparous cells and in the ergastoplasm of the serous glands; (f) appearance of characteristic

oval-shaped structures on the free surface; (g) appearance of some bacteria in the crust. The authors comment on their observations and discuss the etiopathogenetic interpretation of ozena. Author

N66-25666# Army Natick Labs., Mass.
LONG-TERM STORAGE STUDY OF DISINFECTANT, GERMICIDAL AND FUNGICIDAL
Elizabeth Pillion, Arthur M. Kaplan, and Morris R. Rogers Dec. 1965 17 p refs *Its* Microbiological Deterioration Ser. No. 8 (AD-630432) CFSTI: HC $1.00/MF $0.50

A five-year storage test was conducted on Disinfectant, Germicidal and Fungicidal, Phenolic, Dry-Type Specification MIL-D-51061 in order to obtain data on storage stability and performance under adverse climatic conditions. The storage sites were located at Fort Churchill, Canada (arctic, cold–dry), Maynard, Massachusetts (temperature, cold–wet), Yuma, Arizona (desert, hot–dry) and Panama Canal Zone (tropic, hot–wet). After five years of storage in arctic and temperate climates the disinfectant showed no significant change in appearance or composition, and no decrease in bactericidal activity. The samples exposed in the hot environments showed varying degrees of alternation evidence by darkening and liquifaction of the dry powder. Bactericidal activity was lower than control values but sufficient to meet the performance requirements. Author (TAB)

N66-25677# Defence Research Board, Ottawa (Ontario).
AN APPARATUS FOR THE STUDY OF RESPIRATORY GAS METABOLISM IN SMALL ANIMALS
M. D. Hacaniuk Jan. 1966 11 p Transl. into ENGLISH from Fiziol. Zh. (Kiev), v. 1, no. 3, 1955
(T-3-UKR; AD-630483) CFSTI: HC $1.60/MF $0.50

This article describes a gaseous exchange apparatus designed for studying respiratory gas metabolism in animals. The apparatus determines the quantity of consumed oxygen and the amount of carbon dioxide breathed out. Its construction is based on a combination of a volumetric determination of the amount of absorbed oxygen, and a titration method of determining the amount of released carbon dioxide. Included are detailed descriptions of the equipment, its arrangement and operation, a sample carbon dioxide determination, and diagrams and photos of the apparatus. R.N.A.

N66-25762# Library of Congress, Washington, D. C. Aerospace Technology Div.
ENERGY TRANSFER IN PHOTOBIOLOGY AND PHOTOCHEMISTRY Surveys of Soviet Scientific and Technical Literature
Boris Martsissov 31 Dec. 1965 144 p refs Annotated Bibliog., Pt. 1 and 2
(ATD-B-65-102)

An annotated bibliography on energy transfer in both photosynthesis and vision is prepared from the Soviet open literature published between 1958 and 1963. The references, many with abstracts, are arranged alphabetically by author; and subject, author, and association indexes are appended. M.W.R.

N66-25782# Joint Publications Research Service, Washington, D. C.
PARTICIPATION OF BONE MARROW IN THE OXIDATION OF BENZENE
I. D. Gadaskina, Zh. I. Abramova, and T. P. Vikherskaya 23 Feb. 1966 14 p refs Transl. into ENGLISH from Gigiena'truda i Prof. Zabolevaniya (Moscow), no. 12, Dec. 1965 p 3–7 (JPRS-34258; TT-66-30699) CFSTI: $1.00

Experimental studies with rabbits reveal that bone marrow can oxidize benzene more effectively than liver can, and that leukocytes actively oxidize benzene. In the presence of chronic or subacute poisoning, oxidation occurs to a lesser extent than in the bone marrow from healthy animals. Excretion of glucoronides and bound sulfur in the urine is found to drop, after attaining a peak, in spite of continuing intoxication. This finding is considered to be indicative of the importance of bone marrow in benzene oxidation; and experimental confirmation is obtained with a leukocyte suspension which displays only traces of benzene following a two-hour period. M.W.R.

N66-25788# Istituto Superiore di Sanita, Rome (Italy). Laboratori di Fisica.
ACTION SPECTRA OF THE EFFECT OF ULTRAVIOLET RADIATION ON "IN VITRO" DNA OF PHAGE α [SPETTRO D'AZIONE PER L'EFFETTO PRODOTTO DALLA RADIAZIONE ULTRAVIOLETTA SUL DNA DEL FAGO α IRRADIATO "IN VITRO"]
M. Cremonese 17 Nov. 1965 40 p refs In ITALIAN; ENGLISH summary
(ISS-65/45) CFSTI: HC $2.00/MF $0.50

Action spectra of the effect of ultraviolet radiation on the physico-chemical properties of the DNA of phage α irradiated "in vitro" have been obtained. Using the analytical ultracentrifuge and the spectro-photometer the following effects have been studied: (a) production of interruptions in the single polinucleotide strand; (b) local denaturation; (c) presence of a fraction of molecules resistent to denaturation; (d) increase in the buoyant density of irradiated DNA. All of the action spectra thus obtained show a slight variation of the radiation efficiency in the range between 2600 and 2800 Å, and a well-defined peak at λ=2800 Å. Threshold values for all of the examined effects are 3000 Å. Author

N66-25789# Istituto Superiore di Sanita, Rome (Italy). Laboratori di Fisica.
STUDIES ON THE LOCALIZATION OF ASCORBIC ACID IN NORMAL AND NEOPLASTIC CELLS [STUDIO SULLA LOCALIZZAZIONE DELL'ACIDO ASCORBICO IN CELLULE NORMALI E NEOPLASTICHE]
A. Poletti and A. Violante 5 Oct. 1965 14 p refs
(ISS-65/32) CFSTI: HC $1.00/MF $0.50

An attempt has been made to set up a histochemical technique which could be used in the electron microscope to show the presence of vitamin C in the liver of the rat. Caulfield's fixative was used as the fixing liquid. Prefixing with aldehydes was omitted because it was not satisfactory. It was observed that for pieces of about 1 millimeter the time of prefixing which gave the best results was 10–15 minutes, that of treatment with nitrate of silver 10–20 minutes. The following were studied: (a) livers of normal rats, (b) livers of rats which had been given large amounts of ascorbic acid, and (c) livers of rats suffering from a transplanted leukemia. Author

N66-25811# Czechoslovak Academy of Sciences, Prague.
STUDY OF THE SYNTHESIS OF LIPIDS DURING POSTNATAL DEVELOPMENT OF RATS [SLOZENI A SYNTEZA LIPIDU V POSTNATALNIM VYVOJI U KRYS]
Milada Dobiasova 1966 81 p refs In CZECHOSLOVAKIAN; ENGLISH summary *Its* Vol. 76, No. 2

A biochemical study of the lipids during postnatal development of the rat is reported. The preparation of carbon 14 higher fatty acids and the determination of small quantities of lipids on a thin layer of silicagel by chromatographic techniques are described. The content and composition of lipids and their fatty acid content were determined in the liver, lung, small intestine, and brown adipose tissue. Active palmitate was used to study glyceride synthesis. Among the conclusions are: the esterified fatty acid content is lowered immediately after birth in all organs; the phospholipid content increases with age; the acid—phospholipid ratio is dependent on organ and age but not on diet; the triglyceride composition reflects the fatty acid spectrum of the food; palmitic acid is the main acid in the organs of the newborn rat, especially in the lungs; the incorporation of palmitate carbon 14 is highest on day 0, and is greatest in the lung; and active acetoacetic acid production is highest in the liver of 10-day old rats. N.E.N.

N66-25855# John B. Pierce Foundation of Connecticut, New Haven.

NEURONES AND TEMPERATURE REGULATION Final Report, Mar. 1963–Mar. 1965

H. T. Hammel Wright-Patterson AFB, Ohio, AMRL, Dec. 1965 39 p refs

(Contract AF 33(657)-11103)

(AMRL-TR-65-232; AD-630462) CFSTI: HC $2.00/MF $0.50

An attempt was made to ascribe the regulation of body temperature in homeotherms to the hypothalamus and the preoptic region. Results of measurements of hypothalamic temperatures and regulatory responses in the normal dog in hot, neutral and cold environments and, at various times, in the resting, waking, sleeping, exercising and fevered state, are interpreted on the assumption that the hypothalamus responds to changes in its own temperature like a proportional controller with an adjustable set point. For each thermal regulatory response, the response was as if its magnitude were proportional to the deviation of the actual hypothalamic temperature from a set point temperature, and as if the set point temperature were to increase in the cold environment, decrease in the hot environment, decrease at the onset of sleep, decrease at the onset of exercise and increase in fever. A model based on known characteristics of neurones is proposed which appears to function like a proportional controller with an adjustable set point. Author (TAB)

N66-25897# Human Engineering Labs., Aberdeen Proving Ground, Md.

RELIABILITY OF TEMPORARY THRESHOLD SHIFTS CAUSED BY REPEATED IMPULSE-NOISE EXPOSURES

David C. Hodge, R. Bruce Mc Commons, and Raymond F. Blackmer Feb. 1965 34 p refs

(TM-3-65; AD-618324) CFSTI: HC $2.00/MF $0.50

Twenty-two subjects were exposed to the same gunfire-noise condition nine times. Their auditory thresholds were measured at six frequencies from 500 to 6000 cycles per second before and after exposure, and all temporary threshold shifts (TTS) were converted to TTS2 for ease of comparison. Fluctuations in mean TTS2 were five dB or less for all frequencies across the nine exposures, but individual differences were large and the reliability coefficients were small. It was concluded that, while repeated-measurement experimental designs appear appropriate for impulse-noise studies, group data are more meaningful than data for individual subjects. Very small samples of subjects should not be used for such studies, because it is important to be able to generalize the results to the Army as a whole. Author (TAB)

N66-25914# Pittsburgh Univ., Pa. Graduate School of Business.

PSYCHOLOGICAL PREDICTIONS BASED ON BAYESIAN PROBABILITIES

Harry A. Clampett, Jr. Mar. 1966 32 p refs

(Contract Nonr-624(14))

(TR-11; AD-630314) CFSTI: HC $2.00/MF $0.50

Bayesian analysis was applied to personnel predictions in comparison to traditional regression procedures. The main advantage the Bayesian approach has over regression techniques is freedom from the homogeneity-of-variance requirement. It was seen that when the assumption of homogeneous variance is violated, the Bayesian method yields more accurate predictions than the regression method. When the assumption is tenable, the Bayesian and regression approaches yield the same results. Along with algebraic and empirical analyses, computer simulation was used to contrast Bayesian and regression predictions of dichotomous budgeting decisions from scores on intelligence tests and inventories of orientation and personal values. Author (TAB)

N66-25933# Naval Aviation Safety Center, Norfolk, Va.

BODY-BUILD AND SURVIVAL IN EJECTIONS FROM NAVY AIRCRAFT

George T. Lodge [1965] 10 p refs Presented at the 73d Ann. Conv. of the Am. Psychological Assoc., Chicago, 7 Sep. 1965

(AD-630466) CFSTI: HC $1.10/MF $0.50

This study was conducted to determine between body-build and survival in ejections from Navy aircraft. A total of 1,148 ejectees had height/$\sqrt[3]{\text{weight}}$ ratios ranging from 11.72 to 14.06, with a median at 12.78. This distribution was divided into deciles and the proportions determined for each, of survivors to nonsurvivors. Fatalities ranged from a minimum of 6.1% in Decile IV to a maximum of 23.7% in Decile X. Pilots comprising Decile IV are of athletic build and have the most compatible dimensions for cockpits designed according to prevailing height-weight standards. Decile X consists of ectomorphs relatively maladapted to these cockpits, and more disadvantaged by g-stresses, etc., for emergency movements like pulling the face curtain. Author

N66-25960# School of Aerospace Medicine, Brooks AFB, Tex.

A MINIATURIZED VHF FM/FM TELEMETRY SYSTEM Technical Report, Jun. 1963–Jun. 1965

James M. Terry and Dolfo D. Dizon Dec. 1965 16 p refs

(SAM-TR-65-84; AD-477334)

A miniature VHF FM/FM telemetry system was developed that will allow simultaneous monitoring of variable parameters. This telemetry system utilized carrier frequencies of 88 to 230 mc. The design of this telemetry system allows for transmission of a wide range of data over an appreciable distance. The telemetry system can be microminiaturized to fit into a one-tooth space. The basic design can be adapted to almost any shape, depending on its application. The transmitter was developed to study tooth contacts and jaw relation of dental patients. The transmitter is also capable of transmitting a number of other physiologic parameters simultaneously with the proper sensor. Author (TAB)

N66-25962# Northwestern Univ., Evanston, Ill. Auditory Research Lab.

MONAURAL VERSUS BINAURAL DISCRIMINATION FOR FILTERED CNC MATERIALS: THE NORMAL AUDITORY MECHANISM Technical Report, 16 Oct. 1961–15 Dec. 1964

Tom W. Tillman and Raymond Carhart Brooks AFB, Tex., School of Aerospace Med., Dec. 1965 20 p refs
(Contract AF 41(609)-2643)
(SAM-TR-65-79; AD-477337)

By using these filtered materials, a single biaural and two monaural articulation functions were derived for each of 36 normal subjects. In the binaural condition 12 subjects received only low-pass filtered materials, while 12 others received only the high-pass signal. The remaining 12 received both signals simultaneously, one to each ear, in their binaural condition. Monaural functions for the two types of signal rose with approximately equal slopes. The slopes of the binaural functions obtained for a single signal failed to differ from those of the monaural counterpart. Conversely, the slope of the binaural function for the combined signal markedly exceeded those of the monaural ones. The technic described appears promising as a means of identifying patients with central auditory lesions. Author (TAB)

N66-25992# Library of Congress, Washington, D. C. Science and Technology Div.
WORLD OUTLOOK FOR FOOD IRRADIATION
F. J. Weiss Washington, D. C., AEC, 15 Dec. 1965 15 p refs Presented at 24th Ann. Meeting of the Inst. of Food Technologists, Washington, May 1964
(WASH-1063; CONF-639-4) CFSTI: HC $1.00/MF $0.50

Developments in radiosterilization of food and their impact on the world food situation are discussed. NSA

N66-26041# Laboratoires du Centre d'Etude de l'Energie Nucleaire, Mol (Belgium).
PLUTONIUM URINALYSIS
N. Valentin, C. Weyers, and R. Boulenger Jul. 1965 23 p refs (BLG-353)

A simple method of urinalysis, sensitive enough to detect 0.08 dpm of plutonium in 1500 ml of urine, is described. The method consists of a phosphate precipitation followed by the destruction of organic matters by ashing. Anion exchange is used to separate plutonium from other remaining inorganic ions and the final purified plutonium is deposited or electroplated on stainless steel discs and counted in a ZnS scintillator. Ten to twenty samples can be treated per day by two persons, the result being obtained three days after the beginning of the analysis. The recovery of about 3 dis./min of plutonium from a liter of urine is 78±4% with 95% confidence. Author (NSA)

N66-26053# Argentina. Comision Nacional de Energia Atomica, Buenos Aires.
DETERMINATION OF THE TOTAL BODY WATER BY MEANS OF TRITIUM WATER [DETERMINACION DEL AGUA TOTAL CORPORAL MEDIANTE EL AGUA TRITIADA]
Osualdo Degrossi, Maria A. Méndez, and Héctor Gotta 1965 19 p refs In SPANISH; ENGLISH summary
(CNEA-165) CFSTI: HC $1.00/MF $0.50

Tritium water has found increased use as a means of determining total body water volume. The authors have tried four different methods, finding that the most adequate for current laboratory practice is the *internal standards method*. Best time for extraction of samples was found to be four hours after radioactive tracer administration. Data obtained with samples of plasma and urine show no significant difference; either of them can be used. The results are in good agreement with those obtained by other authors. Total body water volume, as percentage of body weight, is equivalent in males and females, being less than average for overweight, and more than average for underweight individuals. It also shows a tendency to decrease with age. Author

N66-26122*# Honeywell, Inc., Hopkins, Minn.
TRACE MATERIAL GENERATION RATE SIMULATOR, APPENDIX B. PART B: STUDY OF GENERATION RATE PATTERNS Final Report
9 Jun. 1965 90 p refs Prepared by North Star Res. and Develop. Inst. for Honeywell
(Contract NAS9-3998)
(NASA-CR-65347) CFSTI: HC $3.00/MF $0.75 CSCL 06K

Research methodology and the results obtained by application of the methodology to the problem of estimating generation rate patterns for trace materials are presented. The trace-material sources are the material, equipment, and the men in a six-cubic-meter capsule designed for a 14-day lunar mission. The first part of the report is an exposition of the rate-controlling mechanism for the gassing of organic materials. A diffusion-controlled mechanism provides the mathematical model for calculation of gassing rates versus time. It is applied to the components of the stabilization and control system (SCS) to arrive at trace-material generation rates. A scheme was devised to use available numerical data on the toxicity of materials to obtain relative toxicity ratings. Some trace materials could then be substituted for others to arrive at a smaller list of materials for use in the TMCU. The relative toxicity ratings have been tabulated. Author

N66-26162# Joint Publications Research Service, Washington, D. C.
ULTRAVIOLET RAYS FOR PROTECTION OF PLANTS
M. I. Zhigal'tseva and S. M. Chernobrovina *In its* Electron. Treat. of Mater. 2 May 1966 p 87-91 ref (See N66-26150 14-34) CFSTI: $4.00

This paper discusses the biological effects of ultraviolet radiation on insects, and its use in attracting and collecting insects to forecast and warn of impending insect invasions on crops and to obtain information on the biology of insect reproduction. R.N.A.

N66-26185# Stanford Research Inst., Menlo Park, Calif.
BIODYNAMIC CORRELATES Final Report, Jun. 1964-Dec. 1965
Samuel A. Ferguson Holloman AFB, N. Mex., 6571st Aeromed. Res. Lab., Feb. 1966 149 p refs
(Contract AF 29(600)-4657)
(ARL-TR-66-2; AD-478863)

An investigation of the injurious and lethal aspects of uniformly distributed applied overpressures were conducted with anesthetized cats submerged in a water chamber. The major site of injury following short (< 10 msec) and moderately long (400 msec) duration overpressures was the central nervous system (CNS). Pulmonary pathology revealed the lungs were also involved. CNS deficits were indicated by overt behavioral and neurological disturbances (ataxia, prolonged unconsciousness) and CNS pathology. Pulmonary pathology was suggested by the presence of blood in the lungs, edema, and emphysema. Where feasible, the median effective level (EP-50) required to produce these effects was determined. A median lethal pressure level (LP-50) of 98 psig was calculated for short duration overpressure application to anesthetized submerged cats during peak exhalation. An analysis of the effects and distribution of applied overpressures on physiological parameters indicated high intracranial and intrathoracic pressures were produced. A correlation of these

observations with pathological and behavioral data suggested that the cause of injury and death was primarily related to alterations in CNS activity. Pulmonary pathology, often noted by other investigators, also appeared to be associated with increases in intrathoracic pressure. Author (TAB)

N66-26227# Atomic Energy Commission, Washington, D. C. Div. of Technical Information.
RADIATION PASTEURIZATION OF FOODS; SUMMARIES OF ACCOMPLISHMENT
[1965] 211 p refs Presented at 5th Ann. Contractors Meeting, Washington, 20–21 Oct. 1965
(CONF-651024) CFSTI: HC $6.00/MF $1.25

Summaries of research efforts which were presented at the AEC's radiation pasteurization of foods program annual contractors meeting are given. The objective of this program is to extend the usable shelf life of both fresh and sometimes cooked food products through the use of ionizing radiation. Included are a current status and summary of each contract, summaries of five general sessions, and scopes of work of contracts in food preservation sponsored by the AEC. C.T.C.

N66-26233*# Maryland Univ., College, Park. Dept. of Psychology.
REINFORCING VALUE OF INFORMATION Technical Report No. 65-1
Derek P. Hendry [1965] 27 p refs
(Grant NsG-189-61)
(NASA-CR-74906) CFSTI: HC $2.00/MF $0.50 CSCL 05J

A description is given of an experiment which was designed to show if information is reinforcing and if negative discriminative stimulus is both positively and negatively reinforcing. This was conducted relative to psychological work in which it is taken for granted that information about favorable or unfavorable states of the environment is reinforcing. That is, people will perform some task just to find out whether some other reinforcing event is likely to occur or likely not to occur. An adolescent female chimpanzee served in the experiment over a period of about 10 months. She had a previous history of reinforcement on ratio and multiple schedules. The chimp lived in the experimental space, which was a stainless steel, temperature controlled, air conditioned chamber. On one wall, 2 ft. above the floor, was a platform, above which was a 30 in. square aluminum work panel containing lights and levers. Water was continuously available, but the daily ration of food had to be obtained by working on the experiment 7 to 10 hrs. daily. Major conclusions are that while some of the results might be explained by traditional theories of conditioned reinforcement, the results as a whole could not be explained without considerable strain and the invention of several ad hoc principles. C.T.C.

N66-26235*# San Francisco Univ., Calif. Inst. of Chemical Biology.
BRAIN AMINO ACIDS AND BIOGENIC AMINES UNDER VARIOUS ATMOSPHERIC MIXTURES Semiannual Report, 1 Mar. 1965–30 Apr. 1966
Joseph H. Gast, H. B. Chermside, III, and M. A. Kelly 9 May 1966 37 p refs
(Grant NGR-05-029-001)
(NASA-CR-75080) CFSTI: HC $2.00/MF $0.50 CSCL 06A

Developments are presented in a study of the possible effects of exposure to different gaseous atmospheric mixtures for various periods of time upon the free amino acids and on the biogenic amines, especially serotonin (5-hydroxytryptamine), present in rat brains. Emphasis is placed on methodology, and includes brief discussions in experimental design, instrumentation, exposure and tissue preparation procedures, preliminary experimental results, and data analysis. C.T.C.

N66-26237*# Computer Concepts, Inc., Los Angeles, Calif.
THE ROLE OF COMPUTERS IN HANDLING AEROSPACE SYSTEMS HUMAN FACTORS TASK DATA Final Report, 3 Jun. 1964–3 Jun. 1965
Irvin R. Whiteman Wright-Patterson AFB, Ohio, AMRL, Dec. 1965 196 p refs
(NASA Order R-115; Contract AF 33(615)-1557)
(NASA-CR-75081; AMRL-TR-65-206; AD-631182) CFSTI: HC $5.00/MF $1.00 CSCL 05B

The characteristics of a computer based data system for handling human factors task information generated in support of advanced system development are described. On the basis of information gathered from users and generators of data at representative Government and contractor installations, the current and potential uses of computers were assessed to determine the desirable characteristics for a computerized human factors task data handling system. The proposed data handling system will assist the human factors specialist and system design engineers in the design and development of systems by providing them with means for: (1) drawing them closer to the data through a user-oriented system, (2) comparing data generated throughout the life-cycle of an advanced system and across systems, (3) analyzing data and conducting man–machine simulations, and (4) insuring that data are made available on a selective query and a timely basis. These objectives are met within the framework of a data system concept referred to as CENTRAL. The functions of CENTRAL are: (1) data storage and retrieval, (2) data processing, (3) computer program maintenance, and (4) system operational manual maintenance. Author (TAB)

N66-26242*# Douglas Aircraft Co., Inc., Santa Monica, Calif. Missile and Space Systems Div.
RADIATION GUIDELINES FOR MANNED SPACE VEHICLES—A REVIEW WITH RECOMMENDATIONS
A. A. Kelton Jul. 1965 118 p refs
(SM-47749)

A rationale, founded upon the philosophical acceptance of risk, was created for the evaluation, development, and application of radiation protection guidelines for manned space vehicles. The rationale was developed from the following: (1) a definition of the character of space radiation exposure, (2) the evaluation of pertinent, risk-limiting, radiobiological responses, and (3) the development of a philosophy of risk acceptance. Radiation risk was compared with the immediate and delayed risks to life from accepted socioeconomic pursuits. From this comparison, acceptable values for acute and late radiation risk were defined for manned space exploration. Within these criteria, current radiation protection guides were reviewed, and additional guidelines for radiation protection of astronauts were recommended. Author

N66-26260*# Kansas State Univ., Manhattan.
[GAS CHROMATOGRAPHY TECHNIQUES FOR THE DETERMINATION OF DILUTE CONSTITUENTS OF BIOLOGICAL MATERIAL, INCLUDING CONSIDERATION OF MATERIAL RELEVANT TO THE ECOLOGY OF ASTRONAUTS] Status Report, Oct. 6, 1965–Apr. 6, 1966
W. S. Ruliffson [1966] 27 p
(Grant NsG-292)
(NASA-CR-74972) CFSTI: HC $2.00/MF $0.50 CSCL 06A

Rat liver tissue was used either as a sucrose homogenate or as a mitochondrial suspension in an effort to establish mass spectrometer techniques for analyzing the dilute constituents of biological materials. The instrumentation for the experiments is described in detail; and data are presented in tabular and graphic form. The results show: (1) that the mass spectrometer is a useful tool for detecting and characterizing small amounts of material evolved by a normal respiring suspension; (2) that the breakdown of methionine by mitochondria, producing $H_3C—S—CH_3$ and $H_3C—S—S—CH_3$, is uncommon; and (3) that aged mitochondria produce M/e 60 (possibly acetic acid), as well as Me (acetone) in greater amounts than that produced by normal fresh mitochondrial. Further, while the data did not establish the importance of ethylene evolution from respiring tissue, it was suggested that C_2H_4 evolution is a general property of life and that ultraviolet radiation may convert C_2H_4 into ethylene oxide or other mutogenic derivatives in vivo. D.T.

N66-26263*# IIT Research Inst., Chicago, Ill.
LIFE IN EXTRATERRESTRIAL ENVIRONMENTS Quarterly Status Report, Feb. 15–May 15, 1966
Charles A. Hagen [1966] 24 p
(Contract NASr-22)
(NASA-CR-74969; IITRI-L6023-5) CFSTI: HC $1.00/MF $0.50 CSCL 06F

Martian environment simulation experiments to study the effects of barometric pressures, carbon dioxide concentrations, and desert soils on Bacillus cereus spores are reported. These included: earth atmosphere at pressures of 10–98 mb; and carbon dioxide concentrations of 37–100% at pressures of 10–98 mb. Spore germination was inhibited by carbon dioxide at all concentrations and pressures. Germination was not inhibited at 10 mb with earth atmosphere, but vegetative cell growth was less than at 98 mb. Graphs are presented showing these effects. Soil ecology experiments to determine the minimum numbers of a bacterium required to survive and grow in different soil types are described. Inhibition of B. cereus spore germination in pulverized felsite/limonite mixture was detected. The spores did not germinate in mixtures of pH 8–8.4, but did germinate in soil of pH 7. Low numbers of P. aeruginosa and S. aureus did not survive 7 days in a desert soil environment with 99% relative humidity at 1013 mb. N.E.N.

N66-26290# Air Force Systems Command, Kirtland AFB, N. Mex. Weapons Lab.
MEDIAN LETHAL DOSE (LD-50/60) STUDIES IN SHEEP FOLLOWING 250 kvp X-IRRADIATION
Thomas S. Mobley, William R. Godden, and Jelle de Boer Mar. 1966 29 p refs
(AFWEL-TR-65-200; AD-631189) CFSTI: HC $2.60/MF $0.50

Seventy-four sheep, Ovis aries, were subjected to bilateral, total-body, 250-kvp X-irradiation at a dose rate of 7.5 r/min. Doses ranging from 218 to 518 r (midline air dose) were administered at nine different dose levels. Probit analysis of the mortality data revealed a 50-percent, 60-day (LD-50/60) lethal dose value of 389 r with 95-percent confidence limits of from 334 r to 437 r. Converting midline air dose to midline tissue does resulted in the value 245 r with limits of from 210 r to 275 r. All deaths occurred between 16 and 32 days following irradiation. Hematological studies and gross necropsies confirmed the severe involvement of the hematologic system. Author (TAB)

N66-26291# Rutgers Univ., New Brunswick, N. J. Dept. of Physiology and Biochemistry.
CARDIOVASCULAR RESPONSES OF DIVING AND NON-DIVING MAMMALS TO APNEA
F. L. Ferrante and H. M. Frankel Brooks AFB, Tex., School of Aerospace Med., Feb. 1966 16 p refs
(Contract AF 41(609)-2635)
(SAM-TR-66-17; AD-631139) CFSTI: HC $1.60/MF $0.50

Heart rate, arterial and right atrial blood pressure, and cardiac output were monitored continuously before and during periods of apnea in anesthetized nutria and cats. In the nutria, arterial blood pressure was maintained at an average of 182 seconds after profound bradycardia developed despite a decreased cardiac output. In cats arterial blood pressure began to decrease at 81±5.5 seconds, an average of 51 seconds before profound bradycardia was observed. The increase in peripheral resistance during apnea in cats was less than 20% of that found in nutria. Evidence of cardiac failure was found before bradycardia in the cat, but not in the nutria. It was concluded cardiovascular responses reported for diving mammals could be initiated by hypoxia and hypercapnia independent of intrathoracic pressure changes and the response of receptors in the nares sensitive to water. Author (TAB)

N66-26304# Ohio State Univ. Research Foundation, Columbus.
INFERENCES ON THE BASIS OF CONDITIONALLY NONINDEPENDENT DATA Final Report
David A. Schum Wright-Patterson AFB, Ohio, AMRL, Dec. 1965 38 p refs
(Contract AF 33(657)-10763)
(AMRL-TR-65-161; AD-630662) CFSTI: HC $3.60/MF $0.50

The experiment was concerned with decision making in a tactical threat situation (simulated). More specifically, it was concerned with the ability of subjects to estimate the likelihood of hypotheses concerning the 'adversary's' intentions being true. The data, presented to the subjects, concerning the enemy, were internally interrelated in a probabilistic sense. The purpose of the study was to evaluate the subjects' ability to exploit these interrelationships in making their estimates concerning the probable intentions of the enemy. The subjects' likelihood estimates as to the enemy's intent were compared with those computed using Bayes' theorem—a mathematical technique that, theoretically, makes maximum use of the data, their interrelationships and their relation to the hypotheses. In general, the estimates made by well-trained subjects agreed closely with those calculated from Bayes' theorem. The subjects apparently were able to exploit the probabilistic interrelationships in the data. Furthermore, the subjects' estimates reflected neither the conservatism nor the 'recklessness' suggested by other previous experiments. Author (TAB)

N66-26305# Oregon State Univ., Corvallis. Radiation Center.
EXPOSURES OF BIOLOGICAL SYSTEMS TO INORGANIC FLUORIDE OXIDIZING AGENTS. VOLUME II: FLUORIDE ANALYSIS BY CHEMICAL METHODS Final Report, 1 Jul. 1964–30 Jun. 1965
Donald J. Reed, Frank N. Dost, and Chih H. Wang Wright-Patterson AFB, Ohio, AMRL, Dec. 1965 27 p refs
(Contract AF 33(615)-1799)
(AMRL-TR-65-223, Vol. II; AD-630593) CFSTI: HC $2.00/MF $0.50

Methods are described for assaying the fluoride content of ashed samples of plant and animal tissues. Using the Hall method, submicrogram quantities of fluoride were measured and a new procedure was devised to measure fluoride in a 1 to 8 microgram range. Modification of the Weinstin procedure, in which an Auto Analyzer is used, permitted rapid and semiautomated analysis of samples containing 2.5 to 100 micrograms of fluoride. Author (TAB)

N66-26307# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

THE PROBLEMS OF BIOLOGY OF SPACE FLIGHT. THE IDEAS OF TSIOLKOVSKI BECOME REALIZED

V. B. Malkin 24 May 1965 24 p refs Transl. into ENGLISH from Priroda (Moscow), no. 10, 1959 p 35–44

(FTD-TT-65-73/1+2; AD-618644)

This paper discusses some of the experimental work of the Russian scientist K. E. Tsiolkovski in the area of space biology. His experiments on the effects of acceleration, water submersion protection against acceleration shock, and the effects of weightlessness are described. His proposals for life support systems, space cabin air regeneration, spacecraft temperature control, and space suits are also discussed.

R.N.A.

N66-26331# Naval Air Development Center, Johnsville, Pa. Aerospace Medical Research Dept.

PSYCHOPHYSICAL METHODOLOGY, III. DEDUCTIONS FROM THE ASSUMPTION THAT A CUMULATIVE SYMMETRICAL DISTRIBUTION UNDERLIES THRESHOLD PHENOMENA

Robert M. Herrick 31 Dec. 1965 18 p refs

(NADC-MR-6515; AD-630391) CFSTI: HC $1.60/MF $0.50

The phi–gamma and quantal hypotheses are special cases of the hypothesis of a cumulative symmetrical distribution. Assuming any cumulative symmetrical distribution it follows that: (a) a descending method of limits (DML) threshold distribution is a mirror image of an ascending method of limits (AML) threshold distribution; (b) the DML mean threshold, M_D, is higher than the AML mean threshold, M_A; (c) $M_A+M_D=S_O+S_n$, where S_O and S_n are the stimuli associated with p values (probability of 'Yes' response) of .00 and 1.00, respectively; (d) the median threshold of the method of constant stimuli is $(S_O+S_n)/2$, as is the mean threshold of the pooled AML and DML distributions. Author (TAB)

N66-26340# Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.

BASIC HUMAN FACTORS TASK DATA RELATIONSHIPS IN AEROSPACE SYSTEM DESIGN AND DEVELOPMENT Final Report, Aug.–Dec. 1965

L. Duncan Hannah (Am. Inst. for Res., Pittsburgh) and Lawrence E. Reed Dec. 1965 61 p refs Prepared in cooperation with Am. Inst. for Res.

(AMRL-TR-65-231; AD-630638) CFSTI: HC $3.00/MF $0.50

The generation, use, and flow of human factors task data in aerospace system design and development are described. The data are characterized by a process of continual transformation in content and form of presentation occurring throughout the iterative cycles of system development. The networks within which data flow are shown to be extensive in size, pervasive in nature, and complex in their dynamic relationships. These dynamic processes are illustrated in flow diagrams showing the relationships of human factors task data and their input/output elements in functional analysis for planning, specifications, task analysis, human engineering, reliability, maintainability, qualitative and quantitative personnel requirements information, training equipment planning information, and maintenance manuals.

Author (TAB)

N66-26356# Lankenau Hospital, Philadelphia, Pa.

EFFECT OF EXERCISE, STANDING, NEGATIVE TRUNK AND POSITIVE SKELETAL PRESSURE ON BED REST-INDUCED ORTHOSTASIS AND HYPERCALCIURIA Final Report, Feb. 1964–Jan. 1965

N. C. Birkhead, J. J. Blizzard, B. Issekutz, Jr., and K. Rodahl Wright-Patterson AFB, Ohio, AMRL, Jan. 1966 36 p refs (Contract AF 33(615)-1538)

(AMRL-TR-66-6; AD-630921) CFSTI: HC $2.00/MF $0.50

Tilt intolerance and hypercalciuria were induced in healthy subjects fed weighed diets by 18–32 days continuous bed rest in a Metabolic Ward. The effect of supplementing bed rest with daily supine bicycle exercise (2 or 4 hours), quiet standing (3 hours), or longitudinal supine skeletal pressure on orthostasis and urinary calcium was determined. Tilt tolerance was evaluated by blood pressure and heart rate response to 10 minutes of 70° head-up body tilt and urinary calcium excretion by analysis of 3- or 6-day urine collections. Supine bicycle exercise was ineffective in significantly reducing tilt intolerance or hypercalciuria. Standing decreased orthostasis in 3 of 5 subjects and decreased urinary calcium in 4 of 5 subjects. Longitudinal skeletal pressure decreased hypercalciuria in 1 of 2 subjects but did not improve tilt tolerance. Intermittent lower body negative pressure during bed rest in one subject impeded development of orthostasis but increased urine calcium. Three hours daily standing is the minimum effective duration for reversing bed rest-induced tilt intolerance and hypercalciuria while supine bicycle exercise is not a practical method for obtaining similar effects. Author (TAB)

N66-26434# Aerospace Medical Div. Aeromedical Research Lab. (6571st), Holloman AFB, N. Mex.

AN INVESTIGATION OF THE RELATIONSHIP BETWEEN EXPERIENCE PARAMETERS AND SUBJECT ACCELERATION RESPONSE IN EXPERIMENTAL IMPACT

Peter Foster Mar. 1966 24 p refs

(ARL-TR-66-8; AD-630788) CFSTI: HC $2.60/MF $0.50

Studies of human test subjects undergoing sustained acceleration on the centrifuge have shown that tolerance increases with experience. This fact suggested the need for an investigation to determine if a similar relationship existed between certain impact experience parameters and subject acceleration response, which was used as an indicator of subject tolerance to impact exposure. A number of human test subjects having varying degrees of experience with experimental impact acceleration were exposed to identical impact profiles. Correlations of experience factors to indicated tolerance showed no significant relationship.

Author (TAB)

N66-26462# New York Univ., N. Y. Inst. of Environmental Medicine.

STATISTICAL ANALYSIS OF ENVIRONMENTAL AND TOTAL BODY GAMMA-RAY SCINTILLATION SPECTRA Annual Progress Report, Oct. 1964–Sep. 1965

Bernard Pasternack and Anthony Liuzzi 30 Sep. 1965 157 p refs

(Contract AT(30-1)-3136)

(NYO-3136-2) CFSTI: HC $5.00/MF $1.00

The statistical analysis of pulse-height distribution data from γ scintillation counting is discussed. Emphasis is placed on the concept of model adequacy, the development of procedures for detecting inappropriate or inadequate models, and the statistical properties of the estimates derived from the calculational procedures. The results of an empirical sampling study designed to investigate the use of overall model confirmed the validity of the method of analysis. A procedure is described that was developed for calculations of instrument gain and baseline discrepancy compensation. Appendixes I through IV contain an IBM 7094 Fortran program, PARANA, for the pulse-height analysis of radionuclide

assay; a test for regression model adequacy in radionuclide assay; results of an empirical sampling study to evaluate the suitability of a statistical model used in analyzing the pulse-height distributions arising from the scintillation counting of radioactive materials; and a statistical study of probability of failure of an idealized light bulb while in use. NSA

N66-26490# Aerospace Medical Div. Arctic Aeromedical Lab., Fort Wainwright, Alaska.
HEART RATE OF BLACK BEARS IN RELATION TO AGE Technical Report, 6 Jan.-1 Sep. 1965
Raymond J. Hock Jan. 1966 10 p refs
(AAL-TR-65-20; AD-630133) CFSTI: HC $1.10/MF $0.50

Records were made of heart rates of 4 black bears, 2 males and 2 females, ages 1 to 42 months, weighing 0.6–70 kg. In the large bears, succinylcholine chloride was administered intramuscularly. The cubs were held while syringe needles connected to an EKG machine were inserted subcutaneously. It appears there is a marked fall in heart rate in black bears with increasing age until adulthood is reached. Succinylcholine vs. handling without anesthetic does not appear to be a factor in the results. Rates seem high, especially those of the larger, older bears. Though rectal temperature was normal, the excitement incident to anesthetic injection and the convulsive nautre of its onset of action must be considered as factors in elevation of heart rate. Thus it seems possible that heart rates of the young bears are more reliable and that decrease in heart rate with age is even more marked than shown.
Author (TAB)

N66-26502# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
RADIATION SAFETY
Yu. Grigor'yev and Ye. Kovalev 1 Feb. 1966 11 p Transl. into ENGLISH from Med. Gazeta (USSR), 21 Sep. 1965 p 3
(FTD-TT-65-1682/1+4; AD-629422) CFSTI: HC $1.60/MF $0.50

A narrative review of the problems encountered in radiation shielding of spacecrafts and for space walks is presented. The nature and composition of galactic cosmic radiation, solar radiation, and the inner and outer radiation belts about the earth are indicated. It is pointed out that the most important source of radiation danger is the corpuscular radiation from chromospheric flares on the sun. The protective measures taken for the Voskhod II space walk are mentioned. Investigations on radiation sickness, biological response to radiation, and pharmacological protection are reviewed.
N.E.N.

N66-26507# Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.
PHYSIOLOGICAL STATUS OF MEN SUBJECTED TO PROLONGED CONFINEMENT Final Report, Feb. 1963–Feb. 1965
E. W. Speckmann, K. J. Smith, K. M. Offner, and J. L. Day (NASA, Manned Spacecraft Center, Houston, Tex.) Dec. 1965 19 p refs Prepared in cooperation with NASA Presented at the Federation Meeting of the Am. Physiological Soc., Atlantic City, 13 Apr. 1965
(NASA Order R-85)
(AMRL-TR-65-141; AD-630114) CFSTI: HC $1.00/MF $0.50

To determine if confinement of men, resulted in physiological changes, 12 men in groups of 4 each were confined for 28 consecutive days. During this time, daily measurements of ECG, EEG, blood pressure, respiration, and oral temperature were made. Oxygen consumption and carbon dioxide production were measured daily on four subjects for 6 days before and for 6 days following confinement as well as three times weekly during confinement. With eight subjects, the same measurements were made before, during, and following exercise on a bicycle ergometer at a rate causing the subject to expend an average of 70 additional kcal per hour above resting values. The same metabolic measurements were made on four subjects 2.5 hours postprandial. The metabolic responses to confinement as well as exercise during confinement were measured. In general, there were no significant measured physiological changes from pretest control values resulting from prolonged confinement. Author (TAB)

N66-26508# Bryn Mawr Coll., Pa. Dept. of Biology.
STUDIES ON MECHANISMS OF TRYPTOPHAN PYRROLASE INHIBITION DURING ENDOTOXIN POISONING Technical Report, 1 Dec. 1964–28 Feb. 1965
George N. Eaves and L. Joe Berry Ft. Wainwright, Alaska, Arctic Aeromed. Lab., Jan. 1966 24 p refs
(Contract AF 41(609)-1764)
(AAL-TR-65-14; AD-630134) CFSTI: HC $1.00/MF $0.50

The inhibition of tryptophan pyrrolase in vitro by plasma and certain other native substances was investigated in an attempt to elucidate mechanisms responsible for the assumed decrease in activity of this enzyme in vivo during endotoxin poisoning. The inhibitor in plasma was present in normal mice, but increased significantly in endotoxin-poisoned, cortisone-protected, tolerant and challenged tolerant mice. On the basis of its physical properties and kinetics of inhibition, the plasma inhibitor was identified circumstantially as a globin. Results of kinetic studies eliminated the plasma inhibitor as a causal factor in the irreversible decrease in activity of tryptophan pyrrolase in whole homogenates of liver from endotoxin-poisoned mice. The enzyme was also found to be inhibited by citrate, the concentration of which increases substantially in the liver during endotoxicosis. Since inhibition by citrate could not be reversed by excess cofactor or substrate, it was concluded that at least part of the decreased activity of tryptophan pyrrolase in whole homogenates of poisoned mice was the result of inhibition by citrate. Author (TAB)

N66-26511# Naval Radiological Defense Lab., San Francisco, Calif.
RESPONSES OF SINGLE NEURONS IN THE OLFACTORY BULBS OF RABBITS, DOGS, AND CATS TO X-RAYS
Gary P. Cooper, Donald J. Kimeldorf 26 Jan. 1966 15 p refs
(USNRDL-TR-969; AD-630323) CFSTI: HC $1.60/MF $0.50

Extracellular microelectrode recordings were made of the activity of single neurons in the olfactory bulbs of anesthetized cats, rabbits, and dogs. In all three species, brief exposure to X-rays (250 KVP; exposure rate, 1 R per second) produced an alteration in firing rate in some olfactory bulb neurons. The response to irradiation was usually an increase in firing rate, but in a few cases a depression in firing rate was observed. Author (TAB)

N66-26529# Electronic Systems Div., Bedford, Mass. Decision Sciences Lab.
HUMAN DIFFERENTIAL SENSITIVITY TO VIBROTACTILE STIMULATION USING A PASSIVE ENVIRONMENTAL SENSOR
John Coules and Donald L. Avery Nov. 1965 31 p refs
(ESD-TR-65-576; AD-627239) CFSTI: HC $2.00/MF $0.50

A passive environmental sensor was evaluated as an input device capable of presenting tactile data to a human. The experiment provided information on the ability of the human to detect differences within the range of the vibratory transducer. Frequency discrimination thresholds showed wide differences between subjects and a significant increase in human sensitivity at one point of the frequency input levels. This increased sensitivity was explained in terms of the resonant frequency of the vibratory and also in terms of the generally known high human sensitivity for amplitude and frequency changes at 200–300 cps. It was concluded that for fine-grain data discrimination individual differences may influence the final design of the sensor. However, these differences may be reduced and the sensitivity of the user improved if its electronic design and its transducers provide redundancy to the human.

Author (TAB)

N66-26531# Ohio State Univ. Research Foundation, Columbus.

VISUAL RECOVERY FROM HIGH INTENSITY FLASHES Interim Report, 15 May 1964–15 May 1965

Norma D. Miller Brooks AFB, Tex., School of Aerospace Med., Jul. 1965 90 p refs

(Contract AF 41(609)-2426)

(ITR-1; AD-627325) CFSTI: HC $3.00/MF $0.75

High intensity flashes of 0.04 msec to 1.4 msec duration were used to determine the afterimage brightness as a function of time following the flash. Six human subjects made continuous matches of the afterimage for periods up to six minutes following the flashes. The flash energies ranged from 3×10^{-7} to 800,000 td.sec or from 0.012 to 0.0003 cal/cm sq. at the retina, neglecting losses in the ocular media. The mean afterimage brightness, 5 sec following the highest intensity flashes, was 100,000 td. The afterimage brightness data were correlated with recovery time measurements for Sloan–Snellen letters presented at luminance levels from 280 mL to 0.07 mL. The reciprocity relationship between the duration and luminance of flashes subtending 7.5 degrees visual angle was investigated for constant flash energy of 3×10^{-7} td.sec. Seven flash durations from 0.5 to 5.0 msec were tested. The recovery times for the Sloan–Snellen letters at various luminance levels increased approximately 30% following 1.5 msec flashes compared with the 0.5 msec flashes. There was no apparent change for the mean recovery times for four subjects following flashes from 1.5 msec in duration.

Author (TAB)

N66-26532# Aberdeen Univ. (Scotland).

THE USE OF CUING IN TRAINING TASKS, PHASE II Technical Report (Final), 30 Jun. 1964–1 Oct. 1965

John Annett and Laura Paterson Port Washington, N. Y., Naval Training Device Center, Feb. 1966 82 p refs

(Contract N62558-4119)

(NAVTRADEVCEN-4119-1; AD-630260) CFSTI: HC $3.00/MF $0.75

The report falls into three sections: a review of the literature on training for auditory tasks, an account of three experiments comparing cuing and knowledge of results as training techniques for a detection task, and the comparison of cuing and knowledge of results in an intensity discrimination task.

Author (TAB)

N66-26556# Duke Univ., Durham, N. C. Medical Center.

INFLUENCE OF ARTERIAL OXYGEN TENSION ON APNEIC THRESHOLD FOR CARBON DIOXIDE IN NORMOTHERMIC AND HYPOTHERMIC DOGS Final Report, Nov. 1962–Nov. 1964

J. V. Salzano and F. G. Hall Wright-Patterson AFB, Ohio, AMRL, Dec. 1965 14 p refs

(Contract AF 33(657)-10279)

(AMRL-TR-65-211; AD-629870) CFSTI: HC $1.00/MF $0.50

Anesthetized dogs were hyperventilated with various CO_2-free gas mixtures containing 6-100% O_2 at a rate of 16 l/min. for 4 minutes at normal and reduced body temperatures (28°C). Arterial blood samples were withdrawn at the start of the first breath following the apneic period and analyzed for PCO_2, PO_2, and pH. The $PaCO_2$ was used as an index of the respiratory threshold for PCO_2 and designated as $PTCO_2$. At both normal and reduced body temperatures the $PTCO_2$ decreased when the PaO_2 was lowered as a result of hyperventilation with a low oxygen gas mixture. The $PTCO_2$ was highest when the PaO_2 was highest following hyperventilation with 100% O_2. The relationship between PaO_2 and $PTCO_2$ was alinear at both temperatures. During normothermia the slope of a plot of the mean values of the $PTCO_2$-PaO_2 relationship was steepest below a PaO_2 of 35 mm Hg and in hypothermia the relationship was steepest below approximately 20 mm Hg PaO_2. The results indicated no real apneic threshold for $PaCO_2$ during normothermia or hypothermia but rather one which directly is related to the PaO_2. Author (TAB)

N66-26568# Applied Science Associates, Inc., Valencia, Pa.

EFFECT OF FORMAT AND DETAIL OF JOB PERFORMANCE AIDS IN PERFORMING SIMULATED TROUBLESHOOTING TASKS Final Report, Nov. 1963–Nov. 1964

Thomas K. Elliott Wright-Patterson AFB, Ohio, AMRL, Nov. 1965 52 p refs

(Contract AF 33(615)-1137)

(AMRL-TR-65-154; AD-629992) CFSTI: HC $3.00/MF $0.50

The effects of performance aid format, performance aid detail, and subject aptitude on the performance of paper and pencil data flow analysis tasks were measured. Sixteen subjects were used in a $2\times2\times2$ design. Eight of these subjects scored between the 75th and 95th percentiles on the electronic aptitude index of the Airman Qualifying Exam, the other eight, between the 40th and 60th percentiles. Each subject received approximately 30 hours of training and practice, following which he was tested at one of the two levels of detail. Each subject was tested for 9 hours with aids in the block diagram format and for 9 hours with aids in the list structure format. Order of testing was counterbalanced across subjects. Criterion measures were: (1) number of problems attempted; (2) percentage of errorless localizations; (3) number of localization errors per problem; (4) number of localization errors of exclusion per problem, and; (5) percentage of errorless isolations. Subject aptitude was found to have the greatest effect on the accuracy with which subjects performed both localization and isolation tasks. Level of detail had the greatest effect on their speed (low level of detail subjects solved nearly twice as many problems as high level of detail subjects). Performance was better with the diagrams than with the list structures. Author (TAB)

N66-26583# Industrial Biology Research and Testing Labs., Inc., Philadelphia, Pa.

CUTANEOUS TOXICITY EVALUATION OF AIR FORCE DEVELOPMENT MATERIALS, VIII Final Report, Jun.–Oct. 1965

Morris V. Shelanski Wright-Patterson AFB, Ohio, AMRL, Dec. 1965 12 p refs

(Contract AF 33(615)-1571)

(AMRL-TR-65-208; AD-629764) CFSTI: HC $1.00/MF $0.50

Four Air Force development materials were studied via the prophetic patch test method on laboratory animals to

determine the primary irritant effect, gross sensitization index, and gross percutaneous toxicity of these materials. The patch test studies with rabbits indicated that one of the materials produced severe primary irritant action. Testing on human volunteers was therefore carried out with three of the materials. Results indicated that these materials were safe to use in contact with human skin. Author (TAB)

N66-26587# Colorado State Univ. Research Foundation, Fort Collins.

A STUDY OF PITUITARY, THYROID AND ADRENAL GLAND RELATIONSHIPS IN GROUND SQUIRRELS (*CITELLUS RICHARDSONI*) AS INFLUENCED BY DIET AND ATMOSPHERIC PRESSURE Final Report

R. R. Lechleitner 10 Dec. 1964 26 p refs
(Contract Nonr-1610 (07))
(AD-609414) CFSTI: HC $1.00/MF $0.50

The objectives of the research were (a) to study the dietary changes occurring in ground squirrels prior to their entrance into hibernation; (b) to determine if a correlation exists between dietary changes and functional activity of the pituitary, thyroid and adrenal cortex, and (c) to study the time relationship of changes in functional activity of these glands. The work accomplished under this contract involved three phases and the results are presented separately for each phase. Phase One consisted of a field investigation of the squirrels under natural conditions near Tie Siding, Wyoming. Phase Two consisted of laboratory studies of circulating pituitary (ACTH, TSH) and thyroid hormones. Phase Three consisted of a laboratory experiment designed to test the efficacy of various diets upon activity patterns, weight gains, endocrine activity, and the hibernating ability of the squirrels. TAB

N66-26598# Naval Radiological Defense Lab., San Francisco, Calif.

EFFECTS OF TOTAL-BODY X-IRRADIATION ON PERITONEAL AND CIRCULATING LEUCOCYTES OF MICE

Lottie Kornfeld and Vivian Greenman 13 Jan. 1966 26 p refs
(USNRDL-TR-966; AD-630103) CFSTI: HC $2.60/MF $0.50

Total-body X-irradiation over a wide range of doses was found to alter the number and distribution of cells in the peritoneal cavity of unstimulated LAF-1 mice. Unirradiated controls yielded $5–7 \times 10^6$ mononuclear cells, about 30% of which were macrophages and 70% small and medium lymphocytes. Following exposure to sublethal X-ray doses (90–590 R), macrophage counts were essentially unaltered for two weeks but declined slightly during the 3rd week after 390–590 R. Following a midlethal dose (690 R), the number of macrophages was unchanged for one week but fell to about 50% of the normal value by 21 days postirradiation. After lethal irradiation (790–1190 R), macrophage counts remained unaltered for 3 days but decreased on the 7th day. The number of lymphocytes in the peritoneal cavity decreased sharply within 24 hours after every dose employed and then declined further at a more gradual rate. Both the initial and the subsequent disappearance of lymphocytes increased in severity with increasing exposure. During the first week postirradiation, a linear relation existed between the percentage of lymphocytes in the peritoneal cell population and the X-ray dose. Author (TAB)

N66-26648*# Oregon State Univ., Corvallis. Dept. of Microbiology.

SYSTEMATIC DESCRIPTION OF BACTERIAL ISOLANTS FROM RIGOROUS ENVIRONMENTS. DESCRIPTIVE CHARTS OF SAHARA DESERT ISOLANTS

W. B. Bollen 1 Apr. 1966 47 p Prepared for JPL
(Contracts NAS7-100; JPL-950783)
(NASA-CR-75107) CFSTI: HC $2.00/MF $0.50 CSCL 06M

Descriptive charts are presented for 19 bacterial isolants from the Sahara Desert. It is pointed out that the results are pending clarification of anomalous reactions. The isolants were identified and broken down into the following groups: (1) Bacillus subtilis; (2) Bacillus megaterium; and (3) Brevibacterium. Two others, not yet identified, are characterized as pleomorphic, appearing generally as cocoid rods; the affinities are uncertain. D.T.

N66-26651*# Naval School of Aviation Medicine, Pensacola, Fla. Naval Aerospace Medical Inst.

MODIFICATION OF VESTIBULAR RESPONSES AS A FUNCTION OF RATE OF ROTATION ABOUT AN EARTH-HORIZONTAL AXIS

Manning J. Correia and Fred E. Guedry, Jr. Mar. 1966 21 p refs
(NASA Order R-93)
(NASA-CR-75112; NAMI-957) CFSTI: HC $1.00/MF $0.50 CSCL 06S

Eight men completed an experiment in which they were rotated about an Earth-horizontal axis at velocities of 10 and 30 RPM. Both nystagmus and subjective estimates of body position in space were modified by the higher rate of rotation. Subjects who gave essentially veridical estimates of body position at 10 RPM became disoriented at 30 RPM and gave responses closely resembling those of subjects with labyrinthine dysfunction. Subjects who produced sustained unidirectional horizontal nystagmus during constant velocity rotation at 10 RPM produced a reversing horizontal nystagmus during comparable intervals of rotation at 30 RPM. Nystagmus slow phase velocity for both 10 and 30 RPM exhibited a cyclic modulation which was related to orientation relative to gravity. As in previous studies, sickness was produced by rotation about a horizontal axis, and a relationship between mental task and incidence of sickness was again noted. Author

N66-26657*# Oregon State Univ., Corvallis.

MICROORGANISM STUDY Progress Report

W. B. Bollen 9 Apr. 1965 68 p Prepared for JPL
(Contracts NAS7-100; JPL-950783)
(NASA-CR-75123) CFSTI: HC $3.00/MF $0.75 CSCL 06M

Descriptive charts are presented for 19 Bacillus cultures of isolants from the Sahara Desert, along with a detailed characterization of the colony. The morphology descriptions are supplemented with photomicrographs of nigrosin, Gram, and Flagella stains. Information is also given on ages, temperature, and media. D.T.

N66-26677# Naval Training Device Center, Port Washington, N. Y.

AN ANALYSIS OF INDUCED MOTION

Leonard Brosgole Feb. 1966 66 p refs
(NAVTRADEVCEN-IH-48; AD-630275) CFSTI: HC $3.00/MF $0.75

Through an analysis of induced motion, the long standing concept of 'object-relative displacement' was rejected in favor of a new theory of motion perception which stresses egocentric location change. Several problems in movement perception (including simulated body movement) were evaluated in terms of this location change theory. Author (TAB)

N66-26684# West Texas State Univ., Canyon.
SOME INTERACTIONS BETWEEN INDIVIDUAL DIFFERENCES AND MODES OF INSTRUCTION
Wilma Jo Bush, Dolores Kathryn Gregg, Edgar A. Smith (Aerospace Med. Res. Labs.), and Coit B. Mc Bride (3320th Retraining Group, Amarillo AFB, Tex.) Wright-Patterson AFB, Ohio, AMRL, Dec. 1965 20 p refs Prepared in cooperation with AMRL and 3320th Retraining Group, Amarillo AFB, Tex.
(Contract AF 33(615)-1460)
(AMRL-TR-65-228; AD-631138) CFSTI: HC $1.60/MF $0.50

This study explored the hypothesis that there is a relationship between patterns of learning ability and the amount learned in different instructional conditions. Scores for each of 44 subjects were obtained on (a) the Reading Vocabulary and the Mathematics Fundamentals subtests of the California Achievement Test, (b) the Administrative and the Mechanical Scales from the Airman Qualifying Examination, and (c) the Verbal and Performance Scales of the Wechsler Adult Intelligence Scale. Each of the 44 subjects also learned in five different training situations. Differences between scores on associated subtests (e.g., Reading Vocabulary minus Mathematics Fundamentals) were correlated with the difference between gain scores obtained in the various learning situations. A significant relationship was observed between the difference on the subtests of the California Achievement Test and the difference between the gain score from lecture-like instruction and the gain score in laboratory-like instruction. The data tended to support the hypothesis that students with relative strength in Reading Vocabulary are superior to students with relative strength in Mathematics Fundamentals when both are required to learn from instructional conditions that are highly verbal. On the other hand, students exhibiting relative strength in Mathematics Fundamentals tend to learn more efficiently in individual laboratory situations than do students showing relative strength in Reading Vocabulary. Author (TAB)

N66-26686*# Harvard School of Public Health, Boston, Mass. Guggenheim Center for Aerospace Health and Safety.
HUMAN PERFORMANCE IN ADVERSE ENVIRONMENTS
Norman H. Mackworth, Warren H. Teichner, and Ross A. McFarland Mar. 1966 39 p refs
(Grant NsG-718)
(NASA-CR-75185) CFSTI: HC $2.00/MF $0.50 CSCL 05E

To discover the factors that may limit astronaut capabilities during prolonged space flight, studies are being conducted on human performance tests that are sensitive and reliable in measuring adverse environmental effects. Test criteria are defined as: high degree of sensitivity for measuring small changes; precise physical measurements; results that are independent of the conscious or unconscious effort exerted; and functional stability during control experiments when the physiological stresses are not applied. Experiments on peripheral seeing were conducted in a low pressure chamber which reduced the oxygen content of the atmosphere to a level equivalent of 8000 feet. Eye tracks were taken from the subjects while they scanned along a strip of visual material to locate a very small square among equivalent sized small black circles on a white ground. Variations in the eye tracks indicate the need for further testing. Experiment designs are also discussed for peripheral seeing of flashing lights, and pattern matching; prolonged seeing of flashing lights, eye track coverage, and detection of texture changes; and for rules recognition for patterns, textures, and serial patterns. M.G.J.

N66-26688*# New England Medical Center Hospitals, Boston, Mass.
BIOMAGNETISM AND FERRITIN Semiannual Report
Peter W. Neurath and Ellen G. Sloane 12 May 1966 21 p
(Grant NGR-22-021-002)
(NASA-CR-75181) CFSTI: HC $2.00/MF $0.50 CSCL 06S

The initial considerations in establishing procedures for investigating the influence of a magnetic field on the development of frogs' eggs and frog embryos are summarized. Fertilization and growth procedures are discussed and methods for obtaining histological and cytological sections of developing eggs and embryos are described. Photographs of the specimen obtained are included. H.S.W.

N66-26720# Naval Ordnance Lab., White Oak, Md.
SYNTHETIC NERVE NETWORKS Final Report
Alfred J. Cote, Jr. 27 Apr. 1965 141 p refs
(NOLTR-65-55; AD-625225) CFSTI: HC $4.00/MF $1.00

Most models of pattern recognition processes are conceived without regard to the difficulties which might be anticipated if one had to fabricate a full scale engineering model embodying the proposed principles. This report discusses recognition systems which take into account the fabrication limitations one would expect to encounter in the construction of extremely high density microelectronic pattern recognition systems. The resulting analog systems respond to transient patterns and the various artificial neurons within them exhibit functional behavior comparable to that found in biological prototypes. The application of these principles is first discussed in terms of a visual processing system which would exhibit many of the properties attributed to nerve fibers in the visual systems of frogs and cats, including those line sensing properties attributed by Hubel to fibres in the cat's visual cortex. The manner in which these same principles can be applied to the problem of sound recognition is then considered. Methods of realization, and an important function of learning in such systems, are also discussed. Author (TAB)

N66-26737# Industrial Science and Technology Agency, Tokyo (Japan).
REVIEW ON MEASUREMENTS OF AND FORMULATIONS OF COLOR DIFFERENCE
Yoshio Sugiyama Aug. 1964 66 p refs In JAPANESE; ENGLISH summary *Its* Circ. of the Electrotech. Lab. No. 156
CFSTI: HC $3.00/MF $0.75

Since Fechner's papers (1801–1887) on psychophysics, experimental and theoretical researches on color difference have been conducted by many investigators. Though some of them are now used in various fields, they are not complete. Moreover, accompanied wih the recent development of psychometrics and biophysics, the problem of color difference is being investigated from different viewpoints, such as physical, psychological and physiological. Experiments on small color differences are described. Thurstone's paper on the law of comparative judgment (1927) was the first on the psychological scaling method. Since then, many scaling methods were developed especially after World War II; the applications of them to the measurements of large color differences are summarized. Also, investigations on the theories of color difference are described and formulations of color difference are reviewed. Author

N66-26740 Ceskoslovenska Akademie Ved, Rez.
MATHEMATICAL-LOGICAL MODEL OF VESTIBULAR AND HEARING IRREGULARITIES [MATHEMATISCH-LOGISCHES MODELL DE VESTIBULAR- UND GEHORSTORUNGEN]
Jaroslav Zelenka and Otakar Zich 1965 46 p refs In GERMAN *Its* Vol. 75, No. 9

The application of cybernetics and mathematical logic in the investigation of disturbances in the inner ear is demonstrated. The stated purpose is the precise formulation of diagnostical findings, the manifestation of the interrelation of separate problems, and a speedier arrival at conclusions. A detailed, two-part model for the investigation of vestibular and hearing deficiencies is given. The problem of vestibular disturbances is also graphically presented by the method of the logical net. Transl. by K.W.

N66-26750*# Aerospace Medical Div. Aeromedical Research Lab. (6571st), Holloman AFB, N. Mex.

THE REFRACTIVE CHARACTERISTICS AND INTRAOCULAR TENSIONS OF COLONY CHIMPANZEES Technical Report, Aug. 1965

Donald N. Farrer and Francis A. Young Nov. 1965 17 p refs
(NASA Order R-35)
(NASA-CR-75169; ARL-TR-65-23) CFSTI: HC $1.00/MF $0.50 CSCL 06C

Ninety-six chimpanzees, 54 males and 42 females, ranging in age from less than 3 years to 15 years, were refracted in both supine and sitting positions under Sernylan anesthesia and Cyclogyl cycloplegia. Intraocular pressures were obtained under the same conditions. High reliability (r=+.930 overall) between refractions and the tendency toward increasing minus refractive error as a function of age was confirmed. Author

N66-26827# General Precision, Inc., Glendale, Calif.

AN AXIOMATIC CONCEPTUAL FRAMEWORK FOR ASSOCIATION THEORY Final Report

Richard F. Reiss (Linacre Coll., Oxford) Dec. 1965 135 p refs
(Contract AF 49(638)-1236)
(AFOSR-66-0597; AD-630429) CSFTI: HC $4.00/MF $1.00

A partially developed axiomatic system, called the SSF frame (state-space-function framework), is described, and is intended for use in formulating a general theory of psychological phenomena, particularly a theory based on associationist concepts. The chief primitive entities of the system are 'states,' moments of time,' and 'occurrences' of a state 'at' various moments of 'time'. A class of objects, 'bases,' is introduced for particular groups of states to enable the empirical interpretation of a 'real object' that can have or be in various observed states at various times. The base of a space is a unique object; there cannot be two or more bases in the same space and, by definition, the base of a space cannot be in two states at the same moment. A relation called an 'alinement' enables consideration of the relations between the spaces of x and y. The framework is deterministic: all functions are divided into 'formal' and 'causal,' the latter derived from the former by means of pairing and special interpretations. A main dichotomy of causal functions is that of 'first-order' vs. 'second-order' types. The notion of a 'sequential' deterministic system is developed that is consistent with the conceptual framework of state spaces and causal functions. The fundamental temporal property of a causal connection, the 'propagation delay,' is introduced and related with the delays of causal functions. The structure of a sequential function is characterized by 'autopaths' in the co-domain corresponding to subsets of the domain, namely those subsets defined by points in A for a function f:AXB–B.
Author (TAB)

N66-26828*# Dartmouth Coll., Hanover, N. H. Dept. of Biological Sciences.

THE EFFECT OF WEIGHTLESSNESS ON THE GROWTH AND ORIENTATION OF ROOTS AND SHOOTS OF MONOCOTYLEDNOUS SEEDLINGS Final Report, 1 Jul. 1964–30 Jun. 1965

Charles J. Lyon 30 Jul. 1965 46 p refs
(Contract NAS2-1558)
(NASA-CR-75092) CFSTI: HC $2.00/MF $0.50 CSCL 06C

An effective method and working models of apparatus have been developed for a 3-day biosatellite experiment to grow wheat seedlings in special seed holders which permit growth of both roots and coleoptile in moist air. A photographic record of the seedlings at the end of the period provides for measurement of orientation angles of the organs. Measurements from tests in preprototype hardware rotating on a horizontal clinostat to simulate the condition of zero gravity by eliminating the tropistic effects of gravity, show characteristic curvatures in 3 dimensions for all organs. These deviations from the growth form of seedlings grown erect to gravity suggest that similar curvatures and other irregularities in orientation may be found in seedlings grown with zero effects of gravity and recovered from the orbital experiment. Author

N66-26840# AiResearch Mfg. Co., Los Angeles, Calif. Dept. of Life Sciences.

REDUCED BAROMETRIC PRESSURE AND RESPIRATORY WATER LOSS, 1 APRIL–31 OCTOBER 1964

Edward C. Wortz, Robert A. Diaz, Frederick H. Green, Warren G. Sanborn, David K. Edwards, III et al Brooks AFB, Tex., School of Aerospace Med., Feb. 1966 81 p refs
(Contract AF 41(609)-2389)
(SAM-TR-66-4; AD-631151) CFSTI: HC $3.00/MF $0.75

Respiratory water loss was investigated with a group of normal subjects breathing oxygen orally. Data were collected from all subjects under three absolute pressures (3.5, 7.0, and 14.7 p.s.i.), three work rates on a treadmill (0, 2, and 4 m.p.h.), three humidities of the inspired oxygen (40°F, 60°F, and 80°F dewpoint), and three drybulb temperatures of the inspired oxygen (95°F, 75°F, and 55°F). The data were analyzed statistically. All of these variables affected respiratory water loss in varying degrees. Reduced pressure diminished respiratory water loss, apparently because of a corresponding decrease in minute volume observed at lower pressures. Increased work rates elevated pulmonary ventilation and thus increased respiratory water loss. Increasing humidity decreased water loss, while increasing drybulb temperature produced greater water loss. Expired gas temperatures approached body temperature only at elevated inspired temperature; the expired gas volume was never saturated. Author (TAB)

N66-26844*# Hamilton Standard Div., United Aircraft Corp., Broad Brook, Conn.

MARS LANDING AND RECONNAISSANCE MISSION ENVIRONMENTAL CONTROL AND LIFE SUPPORT SYSTEM STUDY Fourth Monthly Progress Report (Mid Term)

K. L. Hower 16 Dec. 1963 232 p refs
(Contract NAS9-1701)
(NASA-CR-75250; SLS-404) CFSTI: HC $6.00/MF $1.25 CSCL 06K

This report presents the results of the main subsystem study areas of the Mars landing and reconnaissance mission environment control and life support system study. Analyses were performed on the following subsystems of an environmental control and life support system: atmospheric supply, atmospheric conditioning, thermal control, water management, and instrumentation. The data generated are presented in parametric form to permit evaluation of each subsystem, and selection of the best subsystem in each area. Although the data are presented in summary form, they are complete enough to be used as design tools. R.N.A.

N66-26860*# North American Aviation, Inc., El Segundo, Calif.

VIBROCARDIOGRAPHIC SYSTEM STUDY Final Technical Report, 24 Jul. 1964–15 Jan. 1965

J. T. Celentano, P. R. Barker, and L. N. Wright Washington, NASA, Jun. 1966 78 p ref Prepared for Lear Siegler, Inc., Santa Monica, Calif.
(Contract NAS4-930)
(NASA-CR-504) CFSTI: HC $3.00/MF $0.75 CSCL 06B

The evaluation of a commercially available vibrophonocardiographic sensor, and the determination of the relationship between the record obtained with the sensor and the timing of mechanical cardiac events using animal subjects were undertaken. Vibrophonocardiographic (VCG) data were compared to myocardiographic (MCG), electrocardiographic, and left ventricular blood pressure data. The myocardial activity sensor modifications are mentioned. The experimental procedures of implanting the MCG sensors in dogs, the operative technique and surgical course, and the data collection are given. Both acute and chronic experiments were performed. Among the conclusions are: the MCG sensor was established as a basic tool for studying mechanical activity of the heart; the MCG sensor mounted on a suitable template could provide a tool for studying external apical vibrations when positioned on the apex; time phase shifts across the chest wall are not apparent with either the VCG or MCG; and the VCG events can be correlated to the actual mechanical events of the heart as identified by the MCG.

N.E.N.

IAA ENTRIES

A66-25246 #
AN OPEN CYCLE LIFE SUPPORT SYSTEM FOR MANNED INTERPLANETARY SPACEFLIGHT.
J. Reece Roth (NASA, Lewis Research Center, Cleveland, Ohio).
IN: AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, AND AMERICAN ASTRONAUTICAL SOCIETY, STEPPING STONES TO MARS MEETING, BALTIMORE, MD., MARCH 28-30, 1966. TECHNICAL PAPERS. [A66-25234 13-30]
New York, American Institute of Aeronautics and Astronautics, 1966, p. 130-136. 17 refs.

Proposal for solving the problem of supporting human life during manned interplanetary space missions by integrating the life-support system with the propulsion system. It is proposed that the propellant of the propulsion system be stored in the form of food and utilized by the thrustor in the form of metabolic wastes from the crew. It is shown that this life-support system is compatible with anticipated manned interplanetary missions and payloads, if suitable electric propulsion systems are used. R.A.F.

A66-25266 #
THE MICROBIOLOGY OF SPACE PROBE STERILIZATION.
V. W. Greene (Minnesota, University, School of Public Health, Minneapolis, Minn.).
IN: AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, AND AMERICAN ASTRONAUTICAL SOCIETY, STEPPING STONES TO MARS MEETING, BALTIMORE, MD., MARCH 28-30, 1966. TECHNICAL PAPERS. [A66-25234 13-30]
New York, American Institute of Aeronautics and Astronautics, 1966, p. 320-323.

Discussion of microbiological aspects of space-probe sterilization, and demonstration that they involve not only the application of past knowledge and experience, but also the development of new knowledge and techniques. It is pointed out that already the newer concepts in contamination control are being applied to situations in the hospital field where the need exists for housing humans under germ-free conditions. Similarly, the methodology for low-level biocontamination monitoring is being used in the food industry which is interested in aseptic packaging of sterile food. M.M.

A66-25267 #
NASA STERILIZATION NEEDS.
Gordon P. Kautz (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif.).
IN: AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, AND AMERICAN ASTRONAUTICAL SOCIETY, STEPPING STONES TO MARS MEETING, BALTIMORE, MD., MARCH 28-30, 1966. TECHNICAL PAPERS. [A66-25234 13-30]
New York, American Institute of Aeronautics and Astronautics, 1966, p. 324-327.

To provide a foundation for the understanding of development needs, the ground rules under which planetary-bound spacecraft must be designed and sterilized are delineated. For example, the only acceptable sterilization technique is by means of a choice of a spectrum of temperature-time heat exposures. Reliability and sterility are the inseparable parameters affecting design considerations, tempered by such additional factors as schedules, and the costs associated with design reliability verification. The piece part, subsystem/assembly, and system type approval test programs, as well as the flight hardware tests, are described. Emerging from the sterilization constraints, which in turn have shaped the test programs and sterilization techniques, are a number of areas which indicate particular development emphasis. (Author)

A66-25268 #
A SYSTEM ENGINEERING APPROACH TO SPACECRAFT STERILIZATION REQUIREMENTS.
John B. Opfell and Temple W. Neumann (Philco Corp., Aeronutronic Div., Newport Beach, Calif.).
IN: AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, AND AMERICAN ASTRONAUTICAL SOCIETY, STEPPING STONES TO MARS MEETING, BALTIMORE, MD., MARCH 28-30, 1966. TECHNICAL PAPERS. [A66-25234 13-30]
New York, American Institute of Aeronautics and Astronautics, 1966, p. 328-337. 38 refs.

Recommendations are presented for quantitatively interpreting spacecraft sterilization requirements. Recommended system engineering techniques are applied to the analysis of the sterilization objectives and the technology available for achieving them. These applications have been framed in terms of allocations of effort for performing failure analysis and replicate testing. One of the special difficulties in sterility-status assessment has been the measurement of the component sterility confidence level assignable in the absence of specific experimental thermal death-time data. The analysis suggests that if the present Mars-mission sterilization objectives are to be met, emphasis on understanding the detailed effects of the sterilization and contamination control processes at the materials and component-interface levels is necessary. Concurrently, this detailed examination will also lead to a realistic apportionment of the estimated contribution to planetary contamination by each of the various parts, processes, subsystems, and maneuvers, so that spacecraft sterility can be achieved and maintained. (Author)

A66-25280 #
PSYCHOLOGY AND THE CREW ON MARS MISSIONS.
R. D. Dunlap (Douglas Aircraft Co., Inc., Missile and Space Systems Div., Santa Monica, Calif.).
IN: AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, AND AMERICAN ASTRONAUTICAL SOCIETY, STEPPING STONES TO MARS MEETING, BALTIMORE, MD., MARCH 28-30, 1966. TECHNICAL PAPERS. [A66-25234 13-30]
New York, American Institute of Aeronautics and Astronautics, 1966, p. 441-446.

Discussion of the effect of psychological and sociological stressors on the crews of Mars mission vehicles. Man is conceptualized as an open system which is in dynamic interaction with its environment and attempts to maintain a steady state with respect to that environment by means of inputs, throughputs, and outputs of energy and information. Since in the almost closed environment of a Mars mission vehicle there may not be sufficient inputs or adequate opportunity for outputs, man may be stressed, the possible sources of stress being sensory deprivation, isolation, confinement, and social interaction. It is shown that these sources lead mostly to underload stress. Various approaches to minimizing underload stress are considered at the system and individual levels. The importance of selection, conditioning, and training in increasing resistance to psychological and sociological stresses is emphasized. A.B.K.

A66-25281 #
FUNCTIONAL ANALYSIS OF MAN-MACHINE SYSTEMS FOR INTERPLANETARY EXPLORATION.
Samuel P. Altman (General Electric Co., Missile and Space Div., King of Prussia, Pa.).
IN: AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, AND AMERICAN ASTRONAUTICAL SOCIETY, STEPPING STONES TO MARS MEETING, BALTIMORE, MD., MARCH 28-30, 1966. TECHNICAL PAPERS. [A66-25234 13-30]
New York, American Institute of Aeronautics and Astronautics, 1966, p. 447-467. 23 refs.

The unique cybernetic characteristics of man will increase assurance of mission success for interplanetary exploration, when he is employed as a major working entity in the transport system and also as directing monitor of exploratory observations and experiments. Three new functional analysis techniques for design of man-machine systems are proposed: the derivation of function spectrum number WT as a unique characteristic of function information content; a system model for flow analysis of system information and energy; probabilistic estimation of operational

integrity of the space system as a finite Markovian machine. The proposed techniques of functional analysis are illustrated by discussion of some functional tasks of navigation and guidance for an interplanetary transport system. Preliminary study suggests that the hybrid system design should utilize man principally in the domains of lower function spectrum number, which are categorically ordered in increasing WT value as mission, failure, adaptive, and servo function domains. For effective symbiosis between man and machine, the system design should formalize the man-machine interfaces by means of an integrated synoptic display and control subsystem for: the mission state variables, operational state of the subsystems, and prediction of the operational integrity of system performance. (Author)

A66-25286 #
MICROBIAL ACCUMULATION ON SURFACES IN INDUSTRIAL CLEAN ROOMS.
Harold Finkelstein, Robert Scheir (Douglas Aircraft Co., Inc., Santa Monica, Calif.), and Joseph J. McDade (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif.).
IN: AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, AND AMERICAN ASTRONAUTICAL SOCIETY, STEPPING STONES TO MARS MEETING, BALTIMORE, MD., MARCH 28-30, 1966. TECHNICAL PAPERS. [A66-25234 13-30]
New York, American Institute of Aeronautics and Astronautics, 1966, p. 498-500.

Sterile stainless steel, glass, and lucite strips were used as representative surfaces for measuring microbial accumulation in industrial clean rooms. The data obtained during a 4-1/2-month period demonstrated that microbial accumulation does not continue to build up over a prolonged exposure time, but reaches a plateau, the level of which is dependent upon the degree of environmental control exercised in the area. It is believed that the viable microbial accumulation is a function of both microbial sedimentation and microbial die-away, and at the plateau, both are in equilibrium. (Author)

A66-25287 #
BIOLOGICAL BURDEN ESTIMATION OF MARS PROBES AND CAPSULES AND A METHOD OF BURDEN CONTROL.
E. Botan, J. A. Gautraud, T. Rider, and W. J. Schafer (Avco Corp., Research and Advanced Development Div., Lowell, Mass.).
IN: AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, AND AMERICAN ASTRONAUTICAL SOCIETY, STEPPING STONES TO MARS MEETING, BALTIMORE, MD., MARCH 28-30, 1966. TECHNICAL PAPERS. [A66-25234 13-30]
New York, American Institute of Aeronautics and Astronautics, 1966, p. 501-512. 10 refs.

Examination of the practical consequences of the requirement that the probability of a viable microorganism on a probe or capsule entering the Martian atmosphere be less than 1×10^{-4} in terms of capsule assembly and decontamination procedures. The microbial burden range that can be expected on parts and materials that make up the capsule flight hardware is considered. Two capsule systems that differ greatly in size and complexity are described. Microbial burden analysis divides the burden on parts into internal and surface burden - the internal burden is that part of the microbial population embedded within the material composing the part. Alternate manufacturing and assembly procedures for various factory-to-launch activities are discussed. For the larger capsules it is shown that surface decontamination must be incorporated at the capsule system level to meet requirements. D. P. F.

A66-25288 #
THE STERILIZATION OF PYROTECHNIC DEVICES.
Norman J. Bowman and E. F. Knippenberg (General Electric Co., Missile and Space Div., Philadelphia, Pa.).
IN: AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, AND AMERICAN ASTRONAUTICAL SOCIETY, STEPPING STONES TO MARS MEETING, BALTIMORE, MD., MARCH 28-30, 1966. TECHNICAL PAPERS. [A66-25234 13-30]
New York, American Institute of Aeronautics and Astronautics, 1966, p. 513-521.

Study of the behavior of various pyrotechnic devices and explosives when heated to 145°C for 36 hours (three separate times) for the development of dry-heat sterilizable equipment in space-vehicle technology. Approximately half of the devices that were tested would not fire after being subjected to the triple heat test and in the majority of cases the failure was found to be due to deterioration of the bridge wire mix. The melting point, explosion temperature in five seconds, gas evolution at high temperature, and vacuum stability were the four parameters tested and tabulated for various explosives. The thermal stability of six different materials was tested, three of which contained a B/KNO_3 base. Black powder, lead styphnate, and pure B/KNO_3 were among those found satisfactory in all respects. Specific devices were then tested and on the basis of the results a rocket motor igniter was designed. D. P. F.

A66-25289 #
THE APPLICATION OF GNOTOBIOTIC TECHNIQUES TO THE STERILIZATION PROBLEM.
Philip C. Trexler (Snyder Laboratories, New Philadelphia, Ohio; Charles River Breeding Laboratories, Wilmington, Mass.) and Arnold A. Rothstein (Martin Marietta Corp., Martin Co., Space Exploration Group, Baltimore, Md.).
IN: AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, AND AMERICAN ASTRONAUTICAL SOCIETY, STEPPING STONES TO MARS MEETING, BALTIMORE, MD., MARCH 28-30, 1966. TECHNICAL PAPERS. [A66-25234 13-30]
New York, American Institute of Aeronautics and Astronautics, 1966, p. 522-525. 12 refs.

Evaluation of the degree of biological security attainable by the application of gnotobiotic techniques and isolators to the spacecraft sterilization problem. Contamination experience with the isolator system for housing gnotobiotic animals is reviewed in order to estimate the potential security of the method. Experience with a commercial breeding colony indicates that contamination does not occur; a nucleus colony of gnotobiotic mice were kept for a period of eight years without a single contaminant. An experiment is described which demonstrates that the insertion process can be employed in the presence of a high concentration of spores without any contamination of the isolator. Peracetic acid has been shown by experience to be a rapid and effective sterilant on clean surfaces. The hot wire technique for insertions in flexible-film isolators is described and appears satisfactory for spacecraft application. D. P. F.

A66-25290 #
THE PROBABILITY OF PLANETARY CONTAMINATION BY SPACE PROBES.
Edwin G. Czarnecki, Joseph A. Stern, and Leonard B. Barlow (Boeing Co., Seattle, Wash.).
IN: AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, AND AMERICAN ASTRONAUTICAL SOCIETY, STEPPING STONES TO MARS MEETING, BALTIMORE, MD., MARCH 28-30, 1966. TECHNICAL PAPERS. [A66-25234 13-30]
New York, American Institute of Aeronautics and Astronautics, 1966, p. 526-531. 16 refs.

Analytical approach to the assessment of the probability of planetary contamination by terrestrial life forms from flyby or orbital spacecraft. A summary of the major possible contaminating events which may occur during flyby or orbital missions is diagrammatically presented. The problems posed by contamination resulting from propulsion and reaction control emissions and from ejecta caused by meteoroid impacts are the most critical. A general equation is given for expressing the probability of contamination from spacecraft emissions. The probability of the survival of spores or other living organisms is dependent on (1) survival of entry heating, (2) radiation exposure, and (3) growth probability in the new planetary environment. These three factors are discussed. D. P. F.

A66-25293 #
MARTIAN ENVIRONMENTAL MEDICINE.
Hubertus Strughold (USAF, Systems Command, Aerospace Medical Div., Brooks AFB, Tex.).
IN: AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, AND AMERICAN ASTRONAUTICAL SOCIETY, STEPPING STONES TO MARS MEETING, BALTIMORE, MD., MARCH 28-30, 1966. TECHNICAL PAPERS. [A66-25234 13-30]

New York, American Institute of Aeronautics and Astronautics, 1966, p. 553-557. 15 refs.

Medical evaluation of the Martian environment based on the exploratory experiments and close-up photographs of Mariner 4 and cautious extrapolations from manned flights with durations of two weeks. A minimum in time and an optimum in comfort are the chief requirements for a manned mission to Mars. The absence of an effective magnetosphere will ensure that spacecraft orbiting around Mars will not suffer from concentrations of particle rays of radiobiological significance. The astronauts should not suffer from the 2/5 of 1 g Martian gravity even after a prolonged period of weightlessness. The Martian gravity should be sufficient to activate the otoliths and peripheral mechanoreceptors in the skin and muscles. A closed ecological system with an artificial atmosphere and adequate temperature control will be required to protect humans from the Martian environment. D. P. F.

A66-25336 #

POSSIBLE CONTROL MECHANISM OF THE OCULOMOTOR SYSTEM [O VOZMOZHNYKH MEKHANIZMAKH UPRAVLENIIA GLAZODVIGATEL'NYM APPARATOM].

A. A. Petrov, V. G. Sragovich, and B. G. Sushkov (Akademiia Nauk SSSR, Vychislitel'nyi Tsentr, Moscow, USSR).

Akademiia Nauk SSSR, Doklady, vol. 166, Feb. 11, 1966, p. 1226-1229. 11 refs. In Russian.

Review of some experimental evidence indicating that the human oculomotor system consists of two motor systems. Based on this hypothesis, a model is proposed which explains the eye motions observed for human beings. The model is presented in the form of of a neuron network, whose structure and functions are compatible with available information concerning the morphology of the nervous system. V. P.

A66-25514

PRIMATE INSTRUMENTATION DURING ORBIT.

R. H. Schiffman and C. E. Alvine (California, University, Los Angeles, Calif.).

IN: NEREM RECORD 1965; NORTHEAST ELECTRONICS RESEARCH AND ENGINEERING MEETING, BOSTON, MASS., NOVEMBER 3-5, 1965, PAPERS. VOLUME 7. [A66-25501 13-09]
Meeting sponsored by the New England Sections of the Institute of Electrical and Electronics Engineers.
Boston, Institute of Electrical and Electronics Engineers, Boston Section, 1965, p. 52, 53. Abridged.

Planned study of the central nervous system, the cardiovascular system, the genitourinary system, and skeletal bone densitometry under extended conditions of near-zero gravity. The subject, a pigtail Macaque, will be implanted with ten electroencephalographic electrodes, six probing the deep brain structures and four the cortex. Blood pressure sensors are inserted into the main heart chambers and the arterial system. Studies will also be made of the galvanic skin response, brain and body cavity temperatures, electrooculograms, and electromyograms. The program concept calls for two three-day experiments in the effects of weightlessness and radiation on biological specimens, a 21-day experiment in circadian rhythms, and a 30-day experiment on the effects of weightlessness and confinement on the biological specimens. B. B.

A66-25642 #

BREAKDOWN OF DNA FOLLOWING EXPOSURE TO COSMIC RADIATION AT HIGH ALTITUDE.

S. G. Ong (Academy of Medical Science, Institute of Epidemiology and Microbiology, Peking, Communist China) and F. H. Chang (Academy of Medical Science, Institute of Experimental Medicine, Dept. of Biochemistry, Peking, Communist China).

Kexue Tongbao, vol. 17, Jan. 15, 1966, p. 36, 37.

Preliminary results of exposing thymus deoxyribonucleic acid to direct cosmic radiation at an altitude of 2400 m for 86 days. The viscosity was less than that of a control sample exposed at sea level, and the slope of the viscosity curve was also greatly reduced. This is seen to indicate a breakdown of the rodlike particles. A comparison of UV absorption for the two samples is considered to suggest a breakdown of DNA and of the hydrogen bonds between the bases in the DNA molecule. It was also discovered that the percentage of tumors in mice following an injection of 20-methylcholanthrene was significantly greater at 2400 m than at sea level. This may be due either to the breakdown of DNA or its increased production. R. A. F.

A66-25688

SPACE SIMULATION - HOW FAR TO GO?

Ronald G. Neswald.

Space/Aeronautics, vol. 45, Mar. 1966, p. 65-73.

Discussion of difficulties encountered in space-simulation testing. Different effects require different pressure ranges for investigation. Outgassing and the interaction of the test chamber with the test specimen can cause errors in testing. Temperature and radiation simulation present problems. Pumpdown rates and cost considerations complicate the choice between full-scale testing in large chambers and small-chamber component testing coupled with exhaustive computer analysis. R. A. F.

A66-25702 #

THE ALGATRON - A NOVEL MICROBIAL CULTURE SYSTEM.

Clarence G. Golueke and William J. Oswald (California, University, College of Engineering, Sanitary Engineering Research Laboratory and School of Public Health, Berkeley, Calif.).

Sun at Work, vol. 11, 1st Quarter, 1966, p. 3-9.
Research supported by the University of California; Contract No. AF 19(628)-2462.

Description of the algatron device, for life support systems in space, which through algal photosynthesis is capable of providing potable water, renewing the oxygen supply, and stabilizing human wastes. The essential feature of this device is the mechanical rotation of a culture by means of a drum equipped with a thin transparent wall fashioned in such a manner as to provide a reservoir at its base. An adjustable effluent decanting device and a mixing unit are installed within the drum. The culture suspension flows out of the reservoir and spreads as a vertical sheet on the inside of the rotating drum. With an illumination of 1000 foot candles the yield was 2.255 g/liter/day. A standard man in space would require 20.4 m^2 of algatron surface and less than 85 liters of algal culture. D. P. F.

A66-25762

MEDICAL EVALUATION OF AIRMEN EXPOSED TO SUPERSONIC - TRANSPORT ALTITUDES.

Charles I. Barron (Lockheed Aircraft Corp., Lockheed-California Co., Burbank, Calif.).

Lockheed Horizons, Summer 1965, p. 20-23.

Results from medical examinations of aircraft crew members who have been exposed to the conditions expected to obtain on board the SSTs. From data gathered on crews of high-altitude, high-speed aircraft, it is concluded that current knowledge levels in design reliability and safety can be successfully applied to the supersonic transport and manned military aircraft to make them as routine as current jet operations. R. A. F.

A66-25788

RATE OF MUTATION TO PHAGE RESISTANCE IN ^2H_2O MEDIUM.

Ernest Pollard and Martha Lemke (Pennsylvania State University, Biophysics Dept., University Park, Pa.).

Mutation Research, vol. 2, 1965, p. 213-217.
Grant No. NsG-324.

The rate of mutation of Escherichia coli B to T1 and T2 phage resistance in ^2H_2O medium was compared to the mutation rate in H_2O medium to determine whether the tunneling of a proton from one base to another can account for mutations. The results suggest that photon tunneling, if it causes mutants, is rare when compared with other mechanisms which are responsible for forming mutants. (Author)

A66-25789

INTERMODALITY JUDGMENTS OF SIGNAL DURATION.

Trieve A. Tanner, Jr., R. Mark Patton (NASA, Ames Research Center, Moffett Field, Calif.), and Richard C. Atkinson (Stanford University, Stanford, Calif.).

Psychonomic Science, vol. 2, 1965, p. 271, 272. 5 refs.

Account of experiments where subjects were asked to make both inter- and intramodal comparisons of the durations of lights

and tones in a two-alternative, forced-choice situation, with signal durations between 0.5 sec and 1.6 sec. The probability of a correct judgment was higher for intra- than for intermodal comparisons, and was highest for intraauditory comparisons. For intermodal pairs of signals with durations of 0.5 sec and 0.6 sec, there was a greater-than-chance probability of judging the visual signal longer than the auditory. F. R. L.

A66-25790
THE EFFECT OF EXTENSIVE MESENCEPHALIC CENTRAL GRAY LESIONS ON RESPONSES TO REINFORCING BRAIN STIMULATION.
Verne C. Cox and Elliot S. Valenstein (Fels Research Institute, Yellow Springs, Ohio).
Psychonomic Science, vol. 4, 1965, p. 1, 2. 24 refs.
National Institutes of Health Grant No. M-4529; Grant No. NsG-437.

Experiments on six male albino rats of the Holtzman strain to determine if electrical stimulation of various neural sites would produce motivational consequences resulting in appetitive or defensive behavior. It was found that extensive mesencephalic central gray lesions did not interfere with septal self-stimulation behavior or escape behavior from dorsomedial tegmental stimulation. F. R. L.

A66-25795
MINIATURE BIOPOTENTIAL TELEMETRY SYSTEM.
Gordon J. Deboo and Thomas B. Fryer (NASA, Ames Research Center, Moffett Field, Calif.).
American Journal of Medical Electronics, vol. 4, July-Sept. 1965, p. 138-142. 5 refs.

A subminiature, high-performance, biopotential telemetering system has been developed that features miniature size, inexpensive components and simple construction. The transmitter operates at approximately 90 Mc. Interchanging three components in the basic circuit developed provides two versions of the device; one has a 2-day operating life with a 100-ft range while the other has a 48-day operating life with a 10-ft range. Careful circuit design and the use of new silicon transistors operated at very low current levels allow these features to be attained without sacrificing performance. (Author)

A66-25796
THE COMPARATIVE ENZYMOLOGY OF LACTIC DEHYDROGENASES. IV - FUNCTION OF SULFHYDRYL GROUPS IN LACTIC DEHYDROGENASES AND THE SEQUENCE AROUND THE ESSENTIAL GROUP.
Thomas P. Fondy, Johannes Everse, Geraldine A. Driscoll, Fred Castillo, Francis E. Stolzenbach, and Nathan O. Kaplan (Brandeis University, Graduate Dept. of Biochemistry, Waltham, Mass.).
Journal of Biological Chemistry, vol. 240, Nov. 1965, p. 4219-4234. 54 refs.
American Cancer Society Grant No. P-77G; National Institutes of Health Grant No. CA-03611; Grant No. NsG-375; NSF Grant No. GB-1671.

Experimental study performed on 19 species of crystalline lactic dehydrogenases by titration with p-hydroxymercuribenzoate in 8 M urea. It is found that the number of thiol groups that bound the mercurial varied from 16 to 26 for most of the enzymes, but numbered only 6 in frog M_4 lactic dehydrogenase. It is shown that four thiol groups per molecule are essential for the catalytic operation of the various lactic dehydrogenase tetramers, and this finding is considered to suggest the presence of one active site thiol group per subunit. It is observed that the native enzymes bound p-hydroxymercuribenzoate to the essential thiols at different rates with no measurable change in conformation or molecular weight; and that none of the lactic dehydrogenases bound iodoacetate or iodoacetamide to the essential thiols in the native conformation. The essential thiol groups in frog M_4 lactic dehydrogenase are specifically labeled with iodoacetate-1-^{14}C in 8 M urea. The tryptic peptide containing the labeled thiol group in each subunit is isolated and characterized, and the sequence of the essential thiol peptide as isolated from chicken H_4 lactic dehydrogenase is determined. It is concluded that this active site thiol peptide from the lactic dehydrogenases may be functionally related to the active site thiol region of the alcohol dehydrogenase. M. L.

A66-25797
MICROBIAL CONTROL IN ASSEMBLY AREAS NEEDED FOR SPACECRAFT STERILIZATION.
Dorothy M. Portner, Robert K. Hoffman, and Charles R. Phillips (U.S. Army, Biological Laboratories, Fort Detrick, Md.).
Air Engineering, vol. 7, Oct. 1965, p. 46-49. 10 refs.

Determination of the number of viable aerobes and anaerobes that accumulate on a stainless steel surface in a clean room during one year. Two separate clean room facilities were used in this experiment. Also determined was the resistance of these microorganisms to heat shock, a technique that kills sensitive vegetative microorganisms, but does not kill resistant organisms such as bacterial spores. To give an index of the aerial microbial contamination in the area, the air and aerial fallout were periodically sampled for one or two hours. In addition, the microbial contamination on stainless steel was measured after it was handled by gloved clean room personnel. A comparative study was made of the level of aerobic aerial microbial contamination in a clean room occupied by personnel under three different circumstances: (1) when personnel wearing clean room clothing and masks were sitting, (2) when they were active, and (3) when they were in street clothes and active. The results of this study are tabulated. M. F.

A66-25798
THE SEARCH FOR EXTRATERRESTRIAL LIFE.
Cyril Ponnamperuma (NASA, Ames Research Center, Exobiology Div., Moffett Field, Calif.).
Science Teacher, vol. 32, Oct. 1965. 6 p.

Investigation of three main approaches for studying possible life forms on planets other than the earth. The presence of microorganisms or of enzymes in the soil of planets could be detected by existing devices suitable for use in association with a special probe. A second approach is via radio contact with other civilizations in outer space, assuming the existence of intelligent beings in space with a technology as advanced or even greater than our own. However, the results of the Ozma project, which uses this approach, have been fruitless to date. The third approach hypothesizes that inasmuch as the laws of chemistry and physics are universal, retracing in the laboratory the path by which life appeared on the earth would give strong support to the assumption that it exists elsewhere in the universe. D. P. F.

A66-25872 #
SIMILARITIES OF BIOPHYSICAL PROPERTIES OF SEVERAL HUMAN ENTEROVIRUSES AS SHOWN BY DENSITY GRADIENT ULTRACENTRIFUGATION OF MIXTURES OF THE VIRUSES.
Frederick L. Schaffer (California, University, School of Public Health, Naval Biological Laboratory, Berkeley, Calif.) and Laurence H. Fromhagen (NASA, Ames Research Center, Exobiology Div., Moffett Field, Calif.).
Virology, vol. 25, Apr. 1965, p. 662-664. 12 refs.
Navy-sponsored research; National Institutes of Health Grant No. E-1475.

Direct comparisons of selected examples of human enteroviruses with respect to two biophysical parameters. Buoyant densities are compared by ultracentrifugation of mixtures of viruses, two at a time, in centrifugally formed CsCl gradients. Identity of the viruses in mixtures was resolved with the aid of appropriate specific antisera. Similarly, sedimentation characteristics are determined by ultracentrifugation of pairs of viruses by the rate zonal technique in preformed gradients. Rate zonal banding of a virus is a hydrodynamic phenomenon: the movement of the band is related to sedimentation velocity, and thus to the size of the virus. Buoyant density in heavy salts, on the other hand, depends on the composition of the virus and on solvation. Thus different biophysical parameters are measured by the two techniques. The device, designed to facilitate the sampling of gradients, is shown, and the results of gradient ultracentrifugation of mixtures of viruses are included. M. L.

A66-25875
BIOSYNTHESIS OF EXTRACELLULAR POLYSACCHARIDES BY THE BLUE-GREEN ALGA ANABAENA FLOS-AQUAE.
B. G. Moore and R. G. Tischer (Mississipi State University, Dept. of Microbiology, State College, Miss.).

Canadian Journal of Microbiology, vol. 11, 1965, p. 877-885. 26 refs.
Grant No. NsG-80-60.

Extracellular polysaccharides were isolated from the blue-green alga Anabaena flos-aquae strain A-37. The polysaccharides are composed of glucuronic acid, glucose, xylose, and ribose in a molar ratio of 1:88:39:3. The extracellular polysaccharides comprise about 40% of the total carbohydrate produced by this alga. Carbon utilization experiments revealed that only D-fructose could be substituted for carbon dioxide as a precursor of polysaccharides and cellular material. The extracellular polysaccharides are derived from water-soluble intracellular polysaccharides of the same composition. Fructose accumulates in stationary phase cells grown in CO_2 and the presence of the enzymes fructose diphosphate phosphatase and fructose diphosphate aldolase was demonstrated. Tracer studies showed the presence of phosphorylated compounds common to the photosynthetic carbon reduction cycle and the glycolytic pathway. (Author)

A66-25876

STEROLS OF CHLORELLA. I - THE NATURALLY OCCURRING STEROLS OF CHLORELLA VULGARIS, C. ELLIPSOIDEA, AND C. SACCHAROPHILA.

Glenn W. Patterson and Robert W. Krauss (Maryland, University, Dept. of Botany, College Park, Md.).

Plant and Cell Physiology, vol. 6, 1965, p. 211-220. 14 refs.
Grant No. NsG-70.

The characteristics of the sterols naturally occurring in three species of Chlorella were examined. The algae were grown heterotrophically on glucose. Sterols were extracted and isolated from the lipid fraction and were characterized by means of chemical and physical tests. Chlorella vulgaris contained three sterols. Only the principal one, chondrillasterol, was identified. Chondrillasterol has been isolated previously from the genus Scenedesmus. Chlorella ellipsoidea and Chlorella saccharophila were found to contain sterols with β-oriented alkyl groups at C-24 in contrast to the α-oriented groups commonly found in higher plants. Poriferasterol was identified as the principal sterol of both algae. Clionasterol and 22-dihydrobrassicasterol were identified as the two secondary sterols present. None of these sterols have previously been reported to occur in plants. The isolation of 22-dihydrobrassicasterol has not been previously reported from any natural source. (Author)

A66-25889 #

PHYSIOLOGICAL REACTIONS OF SPACEMEN IN FREE SPACE [FIZIOLOGICHESKIE REAKTSII KOSMONAVTOV V BEZOPORNOM PROSTRANSTVE].

I. I. Kas'ian, I. A. Kolosov, V. I. Kopanev, and V. I. Lebedev.

Akademiia Nauk SSSR, Izvestiia, Seriia Biologicheskaia, vol. 31, Jan.-Feb. 1966, p. 3-13. 7 refs. In Russian.

Tentative discussion of the results of preflight medical tests on Soviet spacemen Beliaev and Leonov during brief simulated weightlessness while moving along a parabolic curve. The experiments were conducted aboard an aircraft in a space capsule mockup. Observations were made of heart beat and respiration rates, and the performance of a spaceman during a simulated space walk outside the capsule was studied. V. Z.

A66-25890 #

SOME ASPECTS OF THE REALIZATION OF AN OPTIMUM ACOUSTIC MEDIUM IN SPACECRAFT CABINS [NEKOTORYE VOPROSY FORMIROVANIIA OPTIMAL'NOI AKUSTICHESKOI SREDY V KABINAKH KOSMICHESKIKH KORABLEI].

E. M. Iuganov, Iu. V. Krylov, and V. S. Kuznetsov.

Akademiia Nauk SSSR, Izvestiia, Seriia Biologicheskaia, vol. 31, Jan.-Feb. 1966, p. 14-20. 20 refs. In Russian.

Discussion of noise parameter control for spacecraft cabins. Under simulated spacecraft conditions, aural reactions of 63 persons on noise were investigated at frequencies to 3000 cps with doses to 76 debye units and exposures from 8 hr to 60 days. Noise levels of 50 to 60 phon are considered permissible in spacecraft cabins. Other studies of the subject are quoted. V. Z.

A66-25891 #

CARDIAC AND RESPIRATORY DEVIATIONS IN SPACEMEN UNDER LIGHT PHYSICAL STRAIN DURING THE ORBITAL FLIGHT OF "VOSKHOD 1" [IZMENENIIA SERDECHNOI DEIATEL'NOSTI I DYKHANIIA U KOSMONAVTOV PRI LEGKOI FIZICHESKOI NAGRUZKE VO VREMIA ORBITAL'NOGO POLETA NA KOSMICHESKOM KORABLE "VOSKHOD-1"].

A. D. Voskresenskii, I. I. Kas'ian, and D. G. Maksimov.

Akademiia Nauk SSSR, Izvestiia, Seriia Biologicheskaia, vol. 31, Jan.-Feb. 1966, p. 21-28. 11 refs. In Russian.

Results of the examination of electrocardiograms, seismocardiograms, and pneumograms of the spacemen Komarov, Feoktistov, and Egorov, obtained in dynamometric tests during the orbital flight of Voskhod 1. Slightly increased heart beat rate and respiration rate and minor deviations in ECG R-R interval and respiratory cycles are observed. Possible causes of these effects are traced. V. Z.

A66-25892 #

VESTIBULAR REACTIONS OF THE DEAF DURING ANGULAR AND CORIOLIS ACCELERATIONS [VESTIBULIARNYE REAKTSII U GLUKHIKH PRI VOZDEISTVII UGLOVYKH I KORIOLISOVYKH USKORENII].

S. S. Markarian.

Akademiia Nauk SSSR, Izvestiia, Seriia Biologicheskaia, vol. 31, Jan.-Feb. 1966, p. 29-36. 19 refs. In Russian.

Results of an experimental study of the vestibular analyser function of 42 deaf persons subjected to angular, coriolis, and radial accelerations by conventional vestibularimetric techniques. No vertigo, nausea, or illusionary perception of displacements was noted by subjects with nonfunctioning vestibular analyzers. The abnormal functioning of the vestibular system of some of the Soviet spacemen is mentioned. V. Z.

A66-25893 #

FIXATION OF MOLECULAR NITROGEN RELATED TO THE ELECTRON-DONOR RESPIRATORY SYSTEM AND PHOTOSYNTHESIS [FIKSATSIIA MOLEKULIARNOGO AZOTA V SVIAZI S ELEKTRONDONORNOI SISTEMOI DYKHANIIA I FOTOSINTEZOM].

I. D. Ivanov and N. S. Demina (Akademiia Nauk SSSR, Institut Mikrobiologii, Moscow, USSR).

Akademiia Nauk SSSR, Izvestiia, Seriia Biologicheskaia, vol. 31, Jan.-Feb. 1966, p. 115-120. 5 refs. In Russian.

Experimental study of the relation between the activity of hydrogenase and dehydrogenases and the nitrogen photofixation in the bacteria Chromatium minutissimum. A theory holding that electron transfer occurs on the cytochrome level of the respiratory chain is adopted and the reduction of triphenyltetrazolium to formazane is used to establish this relation. The decreased formazane formation in an atmosphere of nitrogen in the presence of H_2, fumaric, pyruvic, oxalic, α-ketoglutaric, succinic, malic, and citric acids and ethanol is believed to indicate that hydrogenase and dehydrogenases are active in the nitrogen photofixation. V. Z.

A66-25898

IMMUNOCHEMICAL STUDIES ON INTER-SPECIES MOLECULAR HYBRIDS OF HEMOGLOBIN.

Morris Reichlin, Malgorzata Hay, and Lawrence Levine (Brandeis University, Graduate Dept. of Biochemistry, Waltham, Mass.).

Immunochemistry, vol. 2, 1965, p. 337-350. 18 refs.
Research supported by the American Cancer Society; National Institutes of Health Grant No. AI-01940; Grant No. NsG-375.

Several interspecies hybrids of hemoglobin have been produced, primarily under conditions of acid dissociation but also at alkaline pH. These hybrids have been analyzed using antisera, directed specifically toward horse, human Al, pig, chicken, and mouse hemoglobins. Unfractionated solutions of hybridized hemoglobins fix complement less effectively than the same two hemoglobins incubated separately under identical hybridizing conditions. The isolated hybrids do not fix complement with either homologous antibody at the dilutions of the serum used in the assay, but do inhibit the homologous systems at these serum dilutions. The hybrids will, however, fix complement if serum concentrations greater than those used to measure the homologous system are used. A variety of hemoglobins from different species has been hybridized and the hybrids detected

immunochemically. A mouse-human hybrid system has been analyzed in detail and the serological activities of the isolated hybrids studied quantitatively. Location of the antigenic determinants in two molecules as a result of hybrid formation decreases their serological effectiveness, probably by decreasing the antigenic determinant density. Evidence is presented which demonstrates the feasibility of the immunochemical method being utilized as a measure of hemoglobin hybridization. The possible usefulness of specific antibody in the detection and analysis of hybrid molecules that have been synthesized in vitro is discussed. (Author)

A66-25899
STRESS INDUCED STIMULATION OF LIVER PROTEIN SYNTHESIS INDEPENDENT OF ADRENAL OR PITUITARY ACTION.
Henry A. Leon, D. D. Feller, E. D. Neville, and Bonifacio Daligcon (NASA, Ames Research Center, Environmental Biology Div., Moffett Field, Calif.).
Life Sciences, vol. 4, no. 7, 1965, p. 737-741. 14 refs.

Results of an experimental study of the protein synthesis in the liver of adrenalectomized and hypophysectomized rats exposed to centrifugation stress. The protein synthesis is studied in vitro by preparing - immediately after the stress - postmitochondrial supernatants and by testing the amino acid incorporation using 1-C^{14}-labeled valine. The results show that a mechanism independent of hormones released by the adrenal or pituitary glands is rapidly invoked by centrifugation stress and exerts a considerable influence over the rate of liver protein synthesis. M. L.

A66-25900
A CHLORIDE-ACTIVATED DIPEPTIDYL-β-NAPHTHYLAMIDASE OF THE PITUITARY GLAND.
J. Ken McDonald, Thomas J. Reilly, and Stanley Ellis (NASA, Ames Research Center, Environmental Biology Div., Biochemical Endocrinology Branch, Moffett Field, Calif.).
Life Sciences, vol. 4, no. 17, 1965, p. 1665-1668. 7 refs.

Description of a dipeptidyl-β-naphthylamidase which was detected in extracts of rat and bovine anterior pituitary glands as revealed by the hydrolysis of L-Ser-L-Tyr-β-naphthylamide (ST-β-NA) at pH 4.0. It was reported that cathepsin C will cleave seryltyrosine (ST) from the NH_2-terminus of ACTH. However, the presented results indicate an absence of a detectable quantity of cathepsin C in pituitary extracts - i.e., Gly-L-Phe-amide and Gly-L-Phe-p-nitroanilide were not hydrolyzed at pH 4 or pH 6.5. M. L.

A66-26227 #
INVESTIGATION OF FREE RADICAL PROCESSES IN THE IRRADIATION OF MODEL SYSTEMS, AND THE PART PLAYED BY RADICALS IN RADIATION DAMAGE [IZUCHENIE SVOBODNO RADIKAL'NYKH PROTSESSOV PRI DEISTVII IZLUCHENIIA NA MODEL'NYE SISTEMY I ROL' RADIKALOV V LUCHEVOM PORAZHENII].
N. M. Emanuel', E. B. Burlakova, K. E. Krugliakova, and I. I. Sapezhinskii (Akademiia Nauk SSSR, Institut Khimicheskoi Fiziki, Moscow, USSR).
Akademiia Nauk SSSR, Izvestiia, Seriia Biologicheskaia, Mar.-Apr. 1966, p. 183-196. 16 refs. In Russian.

Experimental investigation of the oxidative recombination of the radicals of irradiated proteins. Data on oxygen absorption by the irradiated proteins together with data obtained by the EPR method indicate that the reaction can proceed by free-valence transfer. EPR and chemiluminescence data indicate the possibility of an exchange reaction between the radicals of the irradiated proteins and the inhibitors of free radical processes. A study of the photo- and X-ray-chemiluminescent processes of irradiated-protein solutions, caused by free-radical recombination, indicate that a number of radiation-protection substances have a pronounced effect on these processes. V. P.

A66-26228 #
ANALYSIS OF SOME RADIATION DAMAGE IN DEOXYRIBONUCLEOPROTEIDS AT THE MOLECULAR AND SUPERMOLECULAR LEVELS [ANALIZ NEKOTORYKH RADIATSIONNYKH NARUSHENII V DEZOKSIRIBONUKLEOPROTEIDAKH NA MOLEKULIARNOM I NADMOLEKULIARNOM UROVNIAKH].
P. I. Tseitlin, D. I. Spitkovskii, A. I. Gorin, B. P. Ivannik, L. G. Kulikova, L. A. Luchkina, E. V. Martynov, N. I. Riabchenko, and T. S. Usakovskaia (Akademiia Meditsinskikh Nauk SSSR, Institut Eksperimental'noi Biologii, Moscow, USSR).
Akademiia Nauk SSSR, Izvestiia, Seriia Biologicheskaia, Mar.-Apr. 1966, p. 197-211. 26 refs. In Russian.

Study of possible damage to DNP caused by ionizing radiation, with particular reference to breaks in the polynucleotide skeleton of DNA and changes developing in DNP supermolecular structures. It is found that the absorption spectra and dispersion curves of DNA optical rotation do not change at doses below 10^4 rads. Irradiation at doses below 10^3 rads causes single breaks only in a small number of DNA molecules; it produces no changes in the physicochemical properties of DNA or DNP but may have some biological effect. It is concluded that the effect of low irradiation doses (structural rearrangement of chromosomes) is not related to changes in DNA macromolecules. V. P.

A66-26229 #
RESULTS OF THE PHYSIOLOGICAL AND BIOCHEMICAL EXAMINATION OF THE CREW MEMBERS OF THE SPACESHIP VOSKHOD [REZUL'TATY FIZIOLOGO-BIOKHIMICHESKOGO OBSLEDOVANIIA CHLENOV EKIPAZHA KOSMICHESKOGO KORABLIA "VOSKHOD"].
I. S. Balakhovskii, P. V. Vasil'ev, I. I. Kas'ian, and I. G. Popov.
Akademiia Nauk SSSR, Izvestiia, Seriia Biologicheskaia, Mar.-Apr. 1966, p. 212-220. 14 refs. In Russian.

Discussion of the physiological responses of the astronauts Komarov, Feoktistov, and Egorov observed during their 24-hour orbital flight. Some functional changes in the cardiovascular and respiratory systems are noted, as are changes in some metabolic functions. These symptoms of stress and fatigue were found to have disappeared after 3 or 4 days. The vegetative functions of the astronauts were found to be essentially of an adaptive nature and to correspond to the stress conditions of the flight. The reactions of the individual astronauts correlated well with preflight expectations. V. P.

A66-26230 #
COMPARATIVE CHARACTERISTICS OF VEGETATIVE REACTIONS IN RESPONSE TO CUMULATIVE METHODS FOR STIMULATING A VESTIBULAR ANALYZER [SRAVNITEL'NAIA KHARAKTERISTIKA VEGETATIVNYKH REAKTSII PRI NEKOTORYKH KUMULIATIVNYKH METODAKH RAZDRAZHENIIA VESTIBULIARNOGO ANALIZATORA].
S. S. Markarian and R. A. Vartbaronov.
Akademiia Nauk SSSR, Izvestiia, Seriia Biologicheskaia, Mar.-Apr. 1966, p. 221-229. 24 refs. In Russian.

Investigation of the vegetative responses of the human organism to angular, linear, and Coriolis accelerations. Functions of the vestibular analyzer are assessed by means of electrocardiographic, seismocardiographic, pneumographic, capillaroscopic, electrothermometric, and oxyhemometric techniques. The most informative indexes of air sickness are seen to be paleness, increased pulse rate, decreased rate of erythrocyte motion, and decreased heat circulation index in the region of the head. A comparison of the methods for stimulating the vestibular apparatus indicates the superiority of the Coriolis acceleration method. V. P.

A66-26250 #
ELECTRON-MICROSCOPIC INVESTIGATION OF MITOCHONDRIA IN THE REGION OF UTRICULAR SYNAPSES IN THE INNER EAR OF VERTEBRATES [ELEKTRONNOMIKROSKOPICHESKOE ISSLEDOVANIE MITOKHONDRII V OBLASTI SINAPSOV UTRIKULIUSA VNUTRENNEGO UKHA POZVONOCHNYKH].
Ia. A. Vinnikov, O. G. Gazenko, L. K. Titova, A. A. Bronshtein, R. A. Pevzner, M. Z. Aronova, and P. V. Vasil'ev (Akademiia Nauk SSSR, Institut Evoliutsionnoi Fiziologii i Biokhimii, Laboratoriia Evoliutsionnoi Morfologii, Leningrad, USSR).
Akademiia Nauk SSSR, Doklady, vol. 166, Feb. 21, 1966, p. 1447-1450. 18 refs. In Russian.

Electron-microscopic investigation of utricular receptor elements of animals both in the state of relative rest and after exposure to accelerations. Some peculiarities observed for the spatial interrelations between the mitochondrial apparatus of capillary cells and the synapses of these cells are examined. V. P.

A66-26251 #
CONTENT OF ELECTROLYTES IN BIOLOGICAL FLUIDS IN THE CASE OF HYPOXIA, AND THE FUNCTIONING OF THE COCHLEA [SODERZHANIE ELEKTROLITOV V BIOLOGICHESKIKH ZHIDKOSTIAKH PRI GIPOKSII I FUNKTSIIA ULITKI].
G. M. Komarovich, M. S. Pluzhnikov, and R. I. Titova (Pervyi Leningradskii Meditsinskii Institut, Leningrad, USSR).
Akademiia Nauk SSSR, Doklady, vol. 166, Feb. 21, 1966, p. 1488-1490. 15 refs. In Russian.

Experimental investigation of the effect of oxygen deficiency on the acoustic organ. The content of potassium and sodium ions in the perilymph, the cerebrospinal fluid, and blood serum of 27 cats (in the state of hypoxia) is determined. A drop in oxygen content in the blood to 40 or 35% of its normal value was found to have no effect on the amplitude of the microphone potentials. A further decrease in oxygen content, however, had a pronounced effect of the functioning of the cochlea. V.P.

A66-25269 #
RELIABILITY AND STERILIZATION.
C. S. Bartholomew and D. C. Porter (Boeing Co., Aerospace Group, Seattle, Wash.).
IN: AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, AND AMERICAN ASTRONAUTICAL SOCIETY, STEPPING STONES TO MARS MEETING, BALTIMORE, MD., MARCH 28-30, 1966. TECHNICAL PAPERS. [A66-25234 13-30]
New York, American Institute of Aeronautics and Astronautics, 1966, p. 338-345.

General discussion of the relationship between reliability and sterilizable electronics. Projections of the difficulties to be expected in meeting NASA spacecraft-sterilization requirements are made. Areas where present technology can easily meet the requirements are identified, as are areas in which it is expected that difficulties will be encountered. Results from exploratory tests of some areas considered likely to be troublesome - e.g., the deleterious effect of temperature dose on high-volume efficiency capacitors and of ethylene oxide on various electronic devices with leaking seals - are briefly discussed. Heat-sterilizable electronics is concluded to be within reach of current technology. R.A.F.

A66-25277 #
SPACESUIT SYSTEMS AND PENALTIES FOR INTERPLANETARY MISSIONS.
E. S. Mills (Douglas Aircraft Co., Inc., Missile and Space Systems Div., Santa Monica, Calif.).
IN: AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, AND AMERICAN ASTRONAUTICAL SOCIETY, STEPPING STONES TO MARS MEETING, BALTIMORE, MD., MARCH 28-30, 1966. TECHNICAL PAPERS. [A66-25234 13-30]
New York, American Institute of Aeronautics and Astronautics, 1966, p. 410-421. 20 refs.

Description of an integrated spacesuit, suit-loop, and backpack system for intravehicular operation on long-duration, interplanetary missions. The system is sufficiently flexible to meet spacecraft requirements and to permit smooth degradation of vehicle and subsystem performance. It incorporates two loops - one for each pressurized compartment or airlock. Hard- and soft-suit concepts for extravehicular operation are compared. Makeup and processing requirements are shown for various operating conditions. The differences between intravehicular operation with or without spacesuits and extravehicular operation with varying durations of spacesuit and backpack activity are demonstrated. R.A.F.

A66-25278 #
A REVIEW OF THE EXPECTED VISUAL ENVIRONMENT OF MARS AND A DISCUSSION OF SOME QUESTIONS RELATED TO VISUAL, PHOTOGRAPHIC, AND RADIOMETRIC EXPERIMENTS.
Richard F. Haines (NASA, Ames Research Center, Moffett Field, Calif.).
IN: AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, AND AMERICAN ASTRONAUTICAL SOCIETY, STEPPING STONES TO MARS MEETING, BALTIMORE, MD., MARCH 28-30, 1966. TECHNICAL PAPERS. [A66-25234 13-30]
New York, American Institute of Aeronautics and Astronautics, 1966, p. 422-432. 43 refs.

This paper reviews the visual appearance of Mars and those parameters related to its photic environment, and discusses some basic experimental questions related to an analysis of man's visual role on a journey to Mars. Sections one to four of the paper primarily describe the Martian continents, seas, canals, craters, polar caps, and atmospheric phenomena. Only information from the visual spectrum is included. Section five presents an analytical treatment of man's role in performing various sighting tasks of the surface and atmosphere of Mars from its surface or orbit. Selected photographic and radiometric measurements are suggested. Several conclusions are drawn in the final section: (1) man will not need any artificial illuminants to perform basic sighting tasks on Mars; however, his eyes must remain adapted to semidarkness; (2) high contrasts are expected on the Martian landscape and may require special lighting or filtering techniques for optimizing visibility; (3) short glances at the sun are not likely to produce anything more than brief afterimages; and (4) constantly changing atmospheric phenomena (primarily yellow clouds) appear to be the largest unknown factor in planning studies of the Martian surface and atmosphere. (Author)

A66-25279 #
A MODEL FOR THE SOCIAL SYSTEM FOR THE MULTIMAN EXTENDED DURATION SPACE SHIP.
S. B. Sells (Texas Christian University, Institute of Behavioral Research, Fort Worth, Tex.).
IN: AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, AND AMERICAN ASTRONAUTICAL SOCIETY, STEPPING STONES TO MARS MEETING, BALTIMORE, MD., MARCH 28-30, 1966. TECHNICAL PAPERS. [A66-25234 13-30]
New York, American Institute of Aeronautics and Astronautics, 1966, p. 433-440.
Grant No. NGR-44-009-008.

Comparison of the social system of the extended-duration spaceship with a number of other social-system profiles suggested as background sources for extrapolation of observations and generalization of principles. Fifty-six reputed system characteristics of the extended-duration spaceship are compared with those of eleven other reference systems, each of which involves isolation, confinement, and/or stress to a high degree. Greatest similarity is found for submarine crews, exploration parties, and ship and bomber crews, and least for shipwreck and disaster victims, work groups, and prisoners. A.B.K.

A66-26317
THE QUEST - A REPORT ON EXTRATERRESTRIAL LIFE.
T. B. Allen.
Philadelphia, Pa., Chilton Co., 1965. 323 p.
$4.95.

A documented report is presented of the current knowledge of scientists and what they hope to learn in the very near future concerning extraterrestrial life. The book is intended for the nonscientific public. Among the topics treated are (1) the study of the origin of life by cosmologically oriented exobiologists, (2) speculation concerning whether other worlds have life as we know it, (3) the search for life signs in meteorites, (4) evidence of life signs on the moon and Mars, (5) problems of tolerance of weightlessness in spaceflight, and (6) the combination of man and machine for space purposes. M.M.

A66-26323
NEW METHOD FOR THE MEASUREMENT OF GASEOUS INERTIA OF THE RESPIRATORY SYSTEM IN MAN [UNE NOUVELLE METHODE DE MESURE DE L'INERTANCE GAZEUSE DU SYSTEME VENTILATOIRE DE L'HOMME].
Pierre Varène, Jean Timbal, and Charles Jacquemin (Centre d'Essais en Vol, Laboratoire de Médecine Aérospatiale, Brétigny-sur-Orge, Seine-et-Oise, France).
Académie des Sciences (Paris), Comptes Rendus, Série D - Sciences Naturelles, vol. 262, no. 11, Mar. 14, 1966, p. 1270, 1271. 5 refs. In French.

Description of a whole-body plethysmographic method for the determination of the total inertia of air breathed by humans. Experiments have demonstrated the existence of dephasing between the

intraplethysmographic pressure and the gaseous output from the mouth; when plotted on a system of rectangular coordinates this dephasing phenomenon appears as a loop. After having made allowance for the effect of various factors involved, it is seen that for high rates of breathing the loop is not closed. It is hypothesized that this lack of a closed cycle may be connected with the inertial factor in human breathing. Based upon a formula for expressing the relationship between the intraplethysmographic pressure and the oral output, a method is described for measuring the gaseous inertia of the human respiratory system. D. P. F.

A66-26546 #

MUTAGENESIS.

R. L. Smith (Lockheed Aircraft Corp., Lockheed-Georgia Co., Research Laboratory, Marietta, Ga.).

Lockheed Georgia Quarterly, vol. 2, Winter 1965-66, p. 12-15. 17 refs.

Discussion of some biochemical topics related to mutation. The microorganisms discovered in 1960 to be infecting the wing tanks of jet aircraft and the countermeasures taken against these microorganisms are described. The role of DNA and RNA in mutation are briefly considered. R. A. F.

A66-26577

FORMATION OF GAS BUBBLES IN AN ORGANISM DURING A PRESSURE DROP [GASBLASENBILDUNG IM ORGANISMUS BEIM DRUCKFALL].

K. G. Müller (Bonn, Universität, Institut für theoretische Physik, Bonn, West Germany) and S. Ruff (Deutsche Versuchsanstalt für Luft- und Raumfahrt, Institut für Flugmedizin, Bad Godesberg, West Germany).

Internationale Zeitschrift für angewandte Physiologie einschliesslich Arbeitsphysiologie, no. 20, 1965, p. 521-544. 11 refs. In German.

Analysis of the conditions in which gas bubbles may arise in the organs and physiological fluids of a living organism. The functioning of elements of physiological transport under low pressure is considered. The physics of bubble formation is discussed in detail, stressing the effect of bubbles on the organism. V. Z.

A66-26578

DESCRIPTION AND CALCULATION OF PHYSIOLOGICAL TRANSPORT PROCESSES [BESCHREIBUNG UND BERECHNUNG PHYSIOLOGISCHER TRANSPORTVORGÄNGE].

K. G. Müller (Bonn, Universität, Institut für theoretische Physik, Bonn, West Germany) and S. Ruff (Deutsche Versuchsanstalt für Luft- und Raumfahrt, Institut für Flugmedizin, Bad Godesberg, West Germany).

Internationale Zeitschrift für angewandte Physiologie einschliesslich Arbeitsphysiologie, no. 20, 1964, p. 337-355. In German.

Development of a method of constructing a mathematical representation for the transport phenomena that take place in a living organism. In analogy with equations describing electrical phenomena, equations are derived to describe the mechanism of physiological transport. Gas transport from ambient air via the lung into the blood of the cell is treated as an example. V. Z.

A66-26581

FACILITATION AND INHIBITION IN THE VISUAL SYSTEM AFTER PHOTIC STIMULATION.

A. Cavaggioni and M. H. Goldstein, Jr. (Massachusetts Institute of Technology, Research Laboratory of Electronics and Dept. of Electrical Engineering, Cambridge, Mass.).

Archives Italiennes de Biologie, vol. 103, 1965, p. 397-420. 17 refs. Contract No. DA-36-039-AMC-03200(E); NSF Grant No. G-16526; National Institutes of Health Grant No. MH-04737-03; Grant No. NsG-496.

Experimental investigation of the changes in the shock-evoked response complex (SERC) recorded from the visual cortexes of cats after the onset and termination of a broad retinal illumination. The test conditions are described. It is found that a large enhancement of the characteristic waveform recorded from visual cortex in response to electric stimulation of the optic radiation is observed after photic stimulation. It is noted that only points 3, 4, and 5 of the SERC are enhanced, as in the results reported by Schoolman and Evarts. A similar enhancement is demonstrated after the termination of a prolonged photic stimulation. It is also found that enhancement is greatly reduced by deep barbiturate anesthetization and that by presenting the shock stimuli to the optic chiasm, an inhibitory effect is demonstrated at the lateral geniculate body which is coincident with facilitation of the cortex. It is concluded that the experiments indicate that it is not likely that the enhancement following transients in photic stimulation is mediated by reticular pathways M. L.

A66-26582

CHANGES IN RENAL BLOOD FLOW AND POSSIBLY THE INTRARENAL DISTRIBUTION OF BLOOD DURING THE NATRIURESIS ACCOMPANYING SALINE LOADING IN THE DOG.

Laurence E. Earley and Robert M. Friedler (Boston City Hospital, Second and Fourth Medical Services, Thorndike Memorial Laboratory; Harvard University, Harvard Medical School, Dept. of Medicine, Boston, Mass.).

Journal of Clinical Investigation, vol. 44, no. 6, 1965, p. 929-941. 31 refs.

National Institutes of Health Grant No. AM-5401-03; Grant No. NsG-595.

Experimental investigation of the effects of isotonic expansion of the extracellular volume on filtered and excreted sodium, renal blood flow, and extraction ratios of p-aminohippurate (PAH), Diordrast, and Hippuran, as studied in anesthetized dogs. It is found that during saline loading, renal blood flow increased and the extraction ratio of PAH (E_{PAH}) decreased. In some experiments it is observed that spontaneous changes in the net tubular reabsorption of sodium occurred during the course of saline loading. Changes in net tubular reabsorption during the natriuresis of saline loading could be demonstrated also by unilateral reduction of renal blood flow. It is found that decreased reabsorption of sodium is always accompanied by decreased E_{PAH} and increased renal blood flow, whereas increased absorption is accompanied by increased E_{PAH} and decreased blood flow. It is concluded that the observations are consistent with the suggestion that diminished net tubular reabsorption of sodium during saline loading may relate in part to an increased medullary blood flow. M. L.

A66-26700

TECHNICAL AND ACOUSTIC PRINCIPLES OF SPEECH AUDIOMETRY [TECHNISCHE UND AKUSTISCHE GRUNDLAGEN DER SPRACHAUDIOMETRIE].

Friedrich Keller (Freiburg, Universität, Klinik für Hals-, Nasen- und Ohrenkranke, Freiburg im Breisgau, West Germany).

Zeitschrift für Instrumentenkunde, vol. 74, Mar. 1966, p. 89-96. 12 refs. In German.

Discussion of the use of tests of speech audiometry to judge the loss of hearing with the aid of the live voice. It is shown that if the test is recorded, objective measurements are possible with a calibrated amplifier and electroacoustic devices, an example of this being the German word test DIN 45 621. The conditions for a life-like transmission are given especially for earphones. It is noted that the speech audiometers presently available do not completely satisfy these conditions. A. B. K.

A66-26733

WATER CONSUMPTION BY MAN IN A WARM ENVIRONMENT - A STATISTICAL ANALYSIS.

J. E. Greenleaf, E. G. Averkin, and Frederick Sargent, II (NASA, Ames Research Center, Moffett Field, Calif.; Illinois, University, Dept. of Physiology and Biophysics, Urbana, Ill.).

Journal of Applied Physiology, vol. 21, Jan. 1966, p. 93-98. 28 refs.

Twenty-two metabolic variables were examined using stepwise linear regression analysis for their possible relationship to voluntary water consumption in 87 young men. Six variables - mean daily urinary volume, serum osmolarity, lying pulse rate, mean daily urinary Cl, mean daily urinary K, and rate of sweating accounted for 62% of the variation in water intake. The addition of the remaining 16 variables accounted for only 71% of the variation. An equation was constructed that estimated water intake from these six variables. The anions, particularly Cl, might be of greater importance in influencing drinking than has been previously realized. The data suggest that some combination of body osmolarity and body fluid volume is associated with voluntary water intake in man. (Author)

A66-26793
STUDIES ON THE MECHANISM OF NATRIURESIS ACCOMPANYING INCREASED RENAL BLOOD FLOW AND ITS ROLE IN THE RENAL RESPONSE TO EXTRACELLULAR VOLUME EXPANSION.
Laurence E. Earley and R. M. Friedler (Boston City Hospital, Thorndike Memorial Laboratory; Harvard University, Medical School, Dept. of Medicine, Boston, Mass.).
Journal of Clinical Investigation, vol. 44, no. 11, 1965, p. 1857-1865. 20 refs.
National Institutes of Health Grant No. AM-5401-04; Grant No. NsG-595.

Experimental study of the effect of unilateral renal vasodilatation on sodium excretion by infusing acetylcholine into the renal artery of dogs under conditions of (1) hydropenia (no saline load), (2) partial saline loading, (3) extensive saline loading, and (4) mannitol diuresis. It was found that unilateral increases in renal plasma flow and decreases in the extraction of p-aminohippurate (or Diodrast) occurred during the infusion of acetylcholine in all four conditions, and that unilateral increases in sodium excretion without equivalent increases in filtered sodium occurred during the infusion of acetylcholine in the hydropenic and partially loaded animals. It is concluded that the observations are consistent with the concept that increases in renal plasma flow per se may result in decreased net tubular reabsorption of sodium. M. L.

A66-26810 #
CHANGES IN THE P WAVE OF THE ELECTROCARDIOGRAM RELATED TO CHANGES OF BODY POSITION IN SPACE [SULLE VARIAZIONI DELL'ONDA P DELL'ELETTROCARDIOGRAMMA IN RELAZIONE ALLE VARIAZIONI DI POSIZIONE DEL CORPO NELLO SPAZIO].
C. Vacca, L. Causa, and A. Aurucci.
(Congresso Internazionale di Astronautica, 16th, Athens, Greece, Sept. 13-18, 1965, Paper.)
Rivista di Medicina Aeronautica e Spaziale, vol. 28, Oct.-Dec. 1965, p. 407-422. In Italian.

Discussion of statistical data of ECG changes observed in 403 young men, during a psychophysiological examination as pilot trainees, as they were subjected to a tilt table test in which they were rapidly shifted from the 0° position to +65° and -65° P wave variations in morphology and voltage were recorded in addition to changes in the electric axis, possibly related to changes of the heart position inside the thorax, due to body tilting. It is pointed out that the P changes bear no relation to QRS electric axis variations in a significant percentage of subjects (38.7%). M. M.

A66-26811 #
EFFECTS OF HYPOXIA ON THYROID FUNCTION - EXPERIMENTAL RESEARCH ON RATS [EFFETTI DELLA IPOSSIA SULLA FUNZIONE TIROIDEA - RICERCHE SPERIMENTALI NEL RATTO].
L. Cramarossa, L. Donati, C. Bramati, and F. De Luca.
Rivista di Medicina Aeronautica e Spaziale, vol. 28, Oct.-Dec. 1965, p. 423-429. In Italian.

Experimental investigation of the effects of chronic hypoxia on the thyroid function of rats. A depression chamber was used to obtain anoxia, with internal barometric pressure of 354 torr, corresponding to a partial oxygen pressure of 74 torr. The exposure for 40 days to hypoxia produced in rats a significant decrease in radioiodine trapping by the thyroid (34.5%) as well as in acinar cell length (35.8%). M. M.

A66-26812 #
FLYING ACCIDENT CASUALTIES - FINDINGS ON THE VICTIMS OF THE COMET 4C SA-R7 ACCIDENT [IN TEMA DI LESIVITA DA INCIDENTE AEREO - A PROPOSITO DEI REPERTI SULLE VITTIME DELL'INCIDENTE DEL COMET 4C "SA-R7"].
A. De Bernardi and P. Tappero.
Rivista di Medicina Aeronautica e Spaziale, vol. 28, Oct.-Dec. 1965, p. 430-439. In Italian.

Description of changes in the bodies of victims of the Comet 4C SA-R7 accident in Italy. Brief comments are made on the particular circumstances of the accident pointing to crash followed by explosion. M. M.

A66-26813 #
CLINICAL AND MEDICOLEGAL CONSIDERATIONS ON A FATAL CASE OF MYOCARDIAL INFARCT INVOLVING A MILITARY PILOT IN FLIGHT [CONSIDERAZIONI CLINICHE E MEDICO-LEGALI SU UN CASO LETALE DI INFARTO MIOCARDICO OCCORSO IN VOLO AD UN PILOTA MILITARE].
G. Rotondo.
Rivista di Medicina Aeronautica e Spaziale, vol. 28, Oct.-Dec. 1965, p. 440-452. 24 refs. In Italian.

Description of the inflight incidence of myocardial infarct in a military pilot, 45 years of age, that ended in death a few minutes after landing. The most likely etiopathogenic mechanism is discussed, with a review of the psychophysiological factors connected with flying that can facilitate the onset and development of atherosclerosis in flying personnel, or at least contribute to the development of latent atherosclerosis by causing local damage and inducing acute vascular phenomena. The medicolegal aspects of the case are discussed, regarding both the service connection of the disease and the prevention of accidents that can be caused by sudden cardiac or vascular attacks suffered by a pilot. M. M.

A66-26814 #
ERYTHROPOIETINE AND POLYGLOBULIA - SOME PHYSIOPATHOLOGICAL AND BIOCHEMICAL DATA [ERITROPOIETINA E POLIGLOBULIE - QUALCHE DATO DI BIOCHIMICA E FISIOPATOLOGIA].
G. Bilancioni.
Rivista di Medicina Aeronautica e Spaziale, vol. 28, Oct.-Dec. 1965, p. 453-474. 58 refs. In Italian.

Description of different techniques for obtaining experimental polyglobulia, and of their relationship to erythropoietine. The properties of erythropoietine, the techniques of dosage and purification, and the differences between erythropoietine and other polyglobulia-inducing factors are described. M. M.

A66-26866
THE BEGINNINGS OF MAN-MADE LIFE.
Cyril Ponnamperuma (NASA, Ames Research Center, Exobiology Div., Chemical Evolution Branch, Moffett Field, Calif.).
Medical Opinion and Review, Dec. 1965, p. 50-53.

Investigation of the synthesis of the constituents of the nucleic acid molecule and the protein molecule. Primitive earth conditions were simulated, and a so-called "primordial soup" was prepared and analyzed. The type of reaction which may have occurred on a dry ocean bed was simulated by heating an intimate mixture of the nucleosides with inorganic phosphate which could have occurred on the primitive earth; in this reaction, phosphorylation took place. It is decided that under simulated primitive earth conditions, molecules of biologic significance can be synthesized. B. B.

A66-26916
INFORMATION DISPLAY.
Frederick A. Muckler and Richard W. Obermayer (Bunker-Ramo Corp., Defense Systems Div., Canoga Park, Calif.).
International Science and Technology, Aug. 1965, p. 34-40.

Discussion of information displays, which are intended to provide a human operator with the kind of information that he can transform into useful decisions or control actions. Present technology can present qualitative, quantitative, symbolic, and pictorial data, but it is not always certain how these forms are best used to assure that the human receiver is getting clear, unambiguous information that can lead to the desired output of the total man-machine system. Although man is a unique information processor, his processing ability is limited by data load and speed stresses to which he adapts remarkably in ways that are not fully understood. The context in which information has value is in a man's head, and this context is in a machine only to the degree that some human has put it there as prior contextual rules of how a system should operate. Combining several types of data on one display indicator does not assure the integration of information, which really occurs in the context of man's interpretation of the display. It is considered that most display design has suffered from a preoccupation with hardware, rather than developing better communication with man. F. R. L.

A66-26919
MAN'S ROLE IN SPACE.
Siegfried J. Gerathewohl (NASA, Washington, D.C.).
International Science and Technology, Sept. 1965, p. 64-66, 68, 74.

Examination of the proposition that, in space, no array of instruments or machines can deal so effectively with the unexpected, can manipulate things so dexterously, or can observe, store data, and draw conclusions with anything like the same skill as a human pilot. Recent flights are considered to support this view. They show that man can survive in space without ill effects, that he can behave reliably, and that he can perform experiments as effectively as he can on the ground. Hence, more elaborate experiments are now planned and are briefly discussed in general terms.
F.R.L.

A66-26967 #
SELECTION OF HUMAN FACTORS TESTS IN LARGE-SCALE OPERATIONAL TESTING OF SYSTEMS.
Sara J. Munger (American Institute for Research, Pittsburgh, Pa.).
American Society of Mechanical Engineers, Human Factors Conference, Washington, D.C., Mar. 28, 29, 1966, Paper 66-Huf-11. 6 p.
Members, $0.75; nonmembers, $1.50.

Description of the constellation of techniques in relation to phases of system development in large-scale operational testing of systems. It is noted that evaluation of human factors during the final demonstration phase of system development has generally been emphasized at the expense of more rigorous human factors assessment by test. Available techniques are described to permit systematic definition of more effective assessment, combining test/evaluation, and compressing assessment activities through scrambling of the data units.
M.F.

A66-26968 #
MANUAL TRACKING CAPABILITIES IN A SHIPBOARD ENVIRONMENT.
James H. Witt (Vitro Corporation of America, Vitro Laboratories, Silver Spring, Md.).
American Society of Mechanical Engineers, Human Factors Conference, Washington, D.C., Mar. 28, 29, 1966, Paper 66-HUF-10. 8 p. 11 refs.
Members, $0.75; nonmembers, $1.50.

The paper presents an analysis of the capabilities of a human observer to track a moving target while subject to the pitch and roll motions encountered in a shipboard environment. Although specifically applied to the problem of manual tracking in a shipboard environment, the analysis may be readily extended to the general problem of manual tracking from an unstable platform. The approach followed is to use an approximation for the human transfer function in a servo loop having both target motion and platform motions as inputs. A numerical example is given for a typical situation for tracking under calm, pitch-only, and roll-only conditions. (Author)

A66-27185 #
ROLE OF THE CONDITIONED REFLEX IN THE INFORMATION OF SUBTHRESHOLD STIMULI OF THE RESPIRATORY SYSTEM [ROL' USLOVNOGO REFLEKSA V INFORMATSII PODPOROGOVYKH RAZDRAZHENII DYKHATEL'NOI SISTEMY].
A. V. Pogrebkova (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR).
Akademiia Nauk SSSR, Doklady, vol. 167, Mar. 1, 1966, p. 241-244. 20 refs. In Russian.

Determination of the role of conditioned reflexes in forming a response to stimulation of the respiratory system. A study is made of dogs subjected to the combined action of a conditioned stimulus in the form of an increase in the CO_2 concentration in the inhaled air and an unconditioned stimulus in the form of an electric shock and also of the same dogs subjected to an increase in the CO_2 concentration serving as an unconditioned stimulus. It is found that subthreshold stimuli of CO_2 in the inhaled air can be converted into suprathreshold stimuli by the formation of a time link. On the other hand, it is also found that, owing to a mechanism of cortical switching, subsequent stimulation by CO_2 without an accompanying electric shock does not exceed the subthreshold boundaries, as a result of which both the conditioned motor and the unconditioned respiratory reactions are absent.
A.B.K.

A66-27308
SOME CHARACTERISTICS OF THE RESISTANCE TRANSFER FACTOR (RTF) EPISOME AS DETERMINED BY INACTIVATION WITH TRITIUM, P^{32}, AND GAMMA RADIATION.
Robert B. Painter (NASA, Ames Research Center, Exobiology Div., Moffett Field; California, University, Medical Center, Laboratory of Radiobiology, San Francisco, Calif.) and Herbert S. Ginoza (NASA, Ames Research Center, Exobiology Div., Moffett Field, Calif.).
Biophysical Journal, vol. 6, no. 2, 1966, p. 153-162. 19 refs.

The resistance transfer factor (RTF) episome was studied by measuring its inactivation by Co^{60} gamma radiation, by incorporated P^{32}, and by tritium incorporated as tritium-labeled thymine. The D_{37} for Co^{60} irradiation was 7 to 9 x 10^4 rad. Growth of the bacteria harboring the RTF in BUdR (bromouracil deoxyriboside) increased the sensitivity of the RTF to the gamma radiation. The RTF was markedly inactivated by tritium after growth of the host (thymine requiring) bacteria in tritium-labeled thymine, thus further establishing the presence of thymine in the genome of the RTF. Assuming the efficiency of inactivation by P^{32} to be 10%, the phosphorus content of the RTF was estimated to be about 2 x 10^5 P atoms/episome. The data suggest the RTF contains double stranded DNA with a molecular weight of the order of 3 to 8 x 10^7. (Author)

A66-27309
THE EFFECT OF SIGNAL INTENSITY ON COMPARATIVE JUDGMENTS OF AUDITORY DURATIONS.
Trieve A. Tanner, Jr., R. Mark Patton (NASA, Ames Research Center, Moffett Field, Calif.), and Richard C. Atkinson (Stanford University, Stanford, Calif.).
Psychonomic Science, vol. 4, no. 10, 1966, p. 353, 354.

Human subjects made comparative judgments of the duration of two tones in a forced-choice situation. Pairs of tones with either the same or different intensities were presented with durations from 0.5 to 1.6 sec. Comparisons were more accurate when the two tones were of the same intensity than when they were of different intensities, and were most accurate when the tones were of higher intensities. The results are compared with previous findings relating comparative judgments of duration to sensory modality. (Author)

A66-27474 #
SOME PHYSIOLOGICAL DIFFERENCES BETWEEN AIR AND LOW PRESSURE OXYGEN ATMOSPHERES.
Wallace O. Fenn (Rochester, University, Medical Center, Space Science Center, Rochester, N.Y.).
Astronautica Acta, vol. 11, Mar.-Apr. 1965, p. 133-141. 30 refs.

Review of the role of nitrogen in respiration with special reference to the question of the necessity for including some nitrogen as part of the atmosphere of space ships. The work of the author and his colleagues in the field of respiration is also partially reviewed. It has been shown that simultaneous exposure to ionizing radiation and pure oxygen enhances the toxic effects of oxygen; experiments on fruit flies have shown the existence of an unexpected synergism between oxygen and nitrogen.
M.M.

A66-27493
MILITARY FLYING AND EXPERIMENTAL PSYCHOLOGY. III [PILOTAGE MILITAIRE ET PSYCHOLOGIE EXPERIMENTALE. III].
A. de Brisson and J. Brémond.
Forces Aériennes Françaises, vol. 20, Apr. 1966, p. 421-437. In French.

Discussion of the factors affecting pilot satisfaction and pilot efficiency. Tests on the degree of apprehensiveness shown by pilots to flying under adverse conditions such as bad weather or fatigue indicate that 18% of the test subjects reported no apprehensiveness whatsoever while 27% of the subjects exhibited a positive reaction for all types of adverse conditions. The influence of family responsibilities on the reactions of pilots to hostile flying environments is considered, and it is shown that the degree of apprehensiveness manifested is inversely proportional to the extent of such responsibilities.
D.P.F.

A66-27552
MEASUREMENT OF BLOOD FLOWS BY THE METHOD OF INDICATORS BY TAKING SAMPLES IN SITU - DYES, THERMODILUTION, KRYPTON 85 [MESURE DES DEBITS SANGUINS PAR LA METHODE DES INDICATEURS PAR PRELEVEMENTS D'ECHANTILLONS IN SITU - COLORANTS, THERMODILUTION, KRYPTON 85].
A. Lockhart (Centre National de la Recherche Scientifique, Laboratoire d'Hémodynamique; Hôpital Boucicaut, Clinique Cardiologique, Paris, France).
(Société Française des Electriciens, Société Française des Electroniciens et des Radioélectriciens, and Association Nationale Française d'Electronique Médicale et Biologique, Conférence, June 17, 1965, Paper.)
L'Onde Electrique, vol. 46, Feb. 1966, p. 213-223. 63 refs.
In French.

Discussion of the general principles of the measurement of flows and volumes of blood by single and continuous injection of indicators. Application of these methods for colored indicators must take account of (1) the properties of the blood base, especially its high optical density, and the difference in the luminous absorption spectra of reduced hemoglobin and of oxyhemoglobin, (2) the luminous absorption spectra of the indicators used, the peaks of which are about 650 mμ for blue dyes, and about 800 mμ for indocyanine green, (3) the existence of variations of the optical density not connected with the variation of concentration of dye in the blood (which might be compensated for by use of dichromatic apparatus), and (4) hydrodynamic properties of the system of taking samples, and of the blood analysis, which involve deformation of the curve of concentration of the indicator as a function of time. The thermodilution curves make it possible to measure cardiac flow and intraventricular volumes. The advantage consists of the small size and the time constant of the thermistors used. The disadvantage involves problems related to the exact measurement of the average temperature of the injected indicator. Comments are made on flow measurement by means of continuous perfusions of diffusable indicators with reference to krypton 85. F.R.L.

A66-27553
ELECTROMAGNETIC AND ULTRASONIC FLOW MEASUREMENT - FUTURE APPLICATIONS OF NUCLEAR RESONANCE AND THE LASER [DEBITMETRIE ELECTROMAGNETIQUE DEBITMETRIE ULTRASONIQUE - EVENTUELLES APPLICATIONS DE LA RESONANCE NUCLEAIRE ET DU LASER].
P. Peronneau (Institut Supérieur d'Electronique de Paris; Centre Nationale de la Recherche Scientifique, Paris, France) and J. Hinglais (Association Claude-Bernard, Centre de Chirurgie Expérimentale, Paris, France).
(Association Nationale Française d'Electronique Médicale et Biologique, Société Française des Electriciens, and Société Française des Electroniciens et des Radioélectriciens, Conférence, June 17, 1965, Paper.)
L'Onde Electrique, vol. 46, Feb. 1966, p. 224-237. 71 refs.
In French.

Discussion of measurements of blood flow rate in an uncovered (but not opened) blood vessel as an important aid to cardiocirculatory physiology. Of two currently available methods, one is the already well established electromagnetic method, which has recently benefited by substantial technical improvements which have converted it into a simple and highly accurate method. Its theoretical, technical, and practical problems are considered. The second method is ultrasonic measurement, more recently applied in physiology, which is considered to be destined for important development. It has the advantages of simplicity of principle and equipment. Brief comment is made on magnetic nuclear resonance and laser methods of measurement. F.R.L.

A66-27554
THE NERVOUS SYSTEM AND RECOGNITION OF PATTERNS [SYSTEME NERVEUX ET RECONNAISSANCE DES FORMES].
J. C. Levy (Ecole National Supérieure de l'Aéronautique, Centre d'Etudes et de Recherches en Automatisme, Paris, France).
L'Onde Electrique, vol. 46, Feb. 1966, p. 248-256. 9 refs.
In French.

Qualitative demonstration of the principles of recognition of temporal or space-temporal patterns through the nervous system. This recognition is effected by a more or less perfect superposition of combinations of cells, which cannot be put into the form of an equation. It is considered that a model, once it is defined, could be subjected to experimental evaluation by simulation on a digital computer. F.R.L.

A66-27650 #
TEMPORAL AND SPATIAL FILTERING IN THE HUMAN VISUAL SYSTEM.
Derek H. Fender (California Institute of Technology, Electrical Engineering and Biology Faculties, Pasadena, Calif.) and David S. Gilbert.
Science Progress, vol. 54, Spring 1966, p. 41-59. 29 refs.
National Institutes of Health Grant No. NB-03627.

Description of the optical capabilities of the eye in terms of its "spatial filtering" effects, combining this with what is known about the temporal characteristics of eye movement and light receptors. It is shown that two of the visual acuities can be explained fairly well by known mechanisms. Sine wave grating acuity is a very powerful tool. Over the range of parameters for which the system is linear, the response to any other acuity target may be synthesized by using the sine wave grating response. Comment is made that it is possible to proceed with a linear form of analysis to a considerable distance. Neural networks in general are nonlinear, and it is considered that the state of advancement of nonlinear mathematics is inadequate for the demands made upon it. F.R.L.

A66-27652 #
INVESTIGATION OF THE TIME CHARACTERISTICS OF THE PROCESS OF DETECTING AND RECOGNIZING THE SHAPE OF THE TWO-DIMENSIONAL ELEMENTS OF A BLACK-AND-WHITE PHOTOGRAPHIC IMAGE [ISSLEDOVANIE VREMENNYKH KHARAKTERISTIK PROTSESSA VOSPRIIATIIA I OPOZNAVANIIA FORMY DVUKHMERNYKH ELEMENTOV CHERNO-BELOGO FOTOGRAFICHESKOGO IZOBRAZHENIIA].
Iu. K. Vifanskii and G. I. Loznevoi.
Zhurnal Nauchnoi i Prikladnoi Fotografii i Kinematografii, vol. 11, Mar.-Apr. 1966, p. 101-111. In Russian.

Application of a special method of chronometric analysis to the investigation of the time characteristics of visual detection and recognition of geometrically simple two-dimensional images of various shapes and sizes, distributed in a random fashion against a homogeneous and a varicolored background. Special numerical characteristics of the detection process are introduced. It is found that the time required for visual detection exceeds by far the time required for the recognition of an image's shape. The minimum time needed to detect and recognize the shape of an image and to pronounce it name is from 0.6 to 0.8 sec for a uniform background, and from 0.9 to 1.1 sec for a varicolored background. V. P.

A66-27657
HAZARDOUS EXPOSURE TO INTERMITTENT AND STEADY-STATE NOISE.
K. D. Kryter (Stanford Research Institute, Menlo Park, Calif.), W. Dixon Ward (Minnesota, University, Minneapolis, Minn.), James D. Miller, and Donald H. Eldredge (Central Institute for the Deaf, St. Louis, Mo.).
Acoustical Society of America, Journal, vol. 39, Mar. 1966, p. 451-464. 22 refs.

Review of a study conducted by the NAS-NRC CHABA (National Academy of Science - National Research Council Committee on Hearing, Bioacoustics, and Biomechanics) Working Group 46 to specify damage-risk criteria for exposure to sound. Graphs of maximum steady-sound pressures and durations of exposures that the Working Group believes would be tolerable are given, along with examples of the use of these graphs. The rationale, assumptions, limitations, and general problems pertinent to the development and application of a damage-risk criterion and related exposure contours are discussed. R.A.F.

A66-27810
EVOLUTION OF THE STRUCTURE OF FERREDOXIN BASED ON LIVING RELICS OF PRIMITIVE AMINO ACID SEQUENCES.
Richard V. Eck and Margaret O. Dayhoff (National Biomedical Research Foundation, Silver Spring, Md.).
Science, vol. 152, Apr. 15, 1966, p. 363-366. 13 refs.
National Institutes of Health Grants No. GM-08710; No. GM-12168; NASA Contract No. 21-003-002.

Paleogenetic study of the structure of ferredoxin. It is thought that the structure of present-day ferredoxin, with its simple, inorganic active site and its functions basic to photon energy utilization, suggests the incorporation of its prototype into metabolism very early during biochemical evolution, even before complex proteins and the complete modern genetic code existed. It is considered that the information in the amino acid sequence of ferredoxin makes possible a reconstruction of its evolutionary history. The persistence of living relics of a primordial structure is explained by invoking a conservative principle in evolutionary biochemistry; the processes of natural selection severely limit any change in a well-adapted system on which several other essential components depend. M. L.

A66-27811
ADRENOCORTICOTROPHIN-RELEASING HORMONE IN PERIPHERAL BLOOD - INCREASE DURING STRESS.
Evelyn Anderson (NASA, Ames Research Center, Moffett Field, Calif.).
Science, vol. 152, Apr. 15, 1966, p. 379, 380. 8 refs.

Experimental study reporting that significant amounts of adrenocorticotrophin-releasing hormone appear in the peripheral blood of rats under conditions of physiological stress. It is found that increased antidiuretic activity is associated with the appearance of this neurohormone. The experimental conditions are described in which stressed and unstressed rats are tested for hormone activity. It is concluded that the neurohormone presumably enters the general circulation by way of the portal vessels of the anterior pituitary gland. M. L.

A66-27820
HUMAN FACTORS IN ENGINEERING. II - ADVANCED MAN-MACHINE SYSTEMS AND CONCEPTS.
Nilo Lindgren.
IEEE Spectrum, vol. 3, Apr. 1966, p. 62-72. 40 refs.

Review of the problems of man-machine systems involved in on-line man/computer interaction, manned space systems, satellite communications, and advanced displays. In discussing man/computer interaction, the psychological problems related to on-line usage are considered, and it is emphasized that a critical factor is the need for more "natural" (to man) interaction languages. Better models of controllers and novel systems are considered in a discussion of man-vehicle control and guidance systems. The use of computers in telephone information services, with respect to search strategies, is noted. "Learning" and display problems related to incorporation of computers in prelaunch activities of advanced space system is considered. A recent study is reviewed in which queuing theory is applied to the prediction and measurement of the patterns and priorities an observer assigns different dials and displays that he is monitoring. It is predicted that such studies will provide rational optimal models of human functioning. M. L.

A66-27844
STERILIZING SPACE PROBES.
Lawrence B. Hall (NASA, Washington, D. C.).
International Science and Technology, Apr. 1966, p. 50-53, 56, 61.

Survey of space probe sterilization procedures. The conditions necessitating sterilization are reviewed, especially the strong aversion to introducing earth organisms onto another planet and so compromising any knowledge of whether life exists or has existed there. Only heat and radiation are considered to be sufficiently reliable preventatives, but radiation is expensive and hazardous and degrades many components as much as or much more than does heat. Present sterilization procedures call for a 1 in 10,000 chance of there being a viable organism aboard, which is achieved by heating at 125°C for 53 hr. The dovetailing of sterilization procedures with the various stages of spacecraft manufacture is discussed. M. L.

A66-28008 #
TOXICOLOGICAL EVALUATION OF MATERIALS ASSOCIATED WITH SPACECRAFT.
Kenneth C. Back (USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Toxic Hazards Div., Toxicology Branch, Wright-Patterson AFB, Ohio).
IN: AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, AND AMERICAN SOCIETY OF MECHANICAL ENGINEERS, STRUCTURES AND MATERIALS CONFERENCE, 7TH, COCOA BEACH, FLA., APRIL 18-20, 1966. TECHNICAL PAPERS. [A66-27986 14-32]
New York, American Institute of Aeronautics and Astronautics, 1966, p. 224-227. 7 refs.

Discussion of a Toxic Hazards Research Unit which has been designed, constructed, and is currently operating to study the toxic hazards of trace contaminants at reduced atmospheric pressure. This inhalation exposure unit has the capacity to perform toxicological research on a large number of animals at simulated atmospheric compositions of typical space cabin conditions (5 to 14 psi), and in either single gas (oxygen) or mixed gas (oxygen/nitrogen) atmospheres. The unit is capable of performing experiments continuously from two weeks to more than one year. The questions being investigated are whether a 5-psi oxygen atmosphere causes pulmonary irritation or functional impairment, whether such an atmosphere will influence tolerance to toxic materials, whether a mixed-gas atmosphere will influence tolerance to toxic materials, and various others. Test results on mice, rats, dogs, and monkeys are presented. F. R. L.

A66-28017 #
STRUCTURAL DYNAMIC RESEARCH RELATED TO MANNED SPACE FLIGHT.
Harry L. Runyan (NASA, Langley Research Center, Dynamic Loads Div., Hampton, Va.).
IN: AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, AND AMERICAN SOCIETY OF MECHANICAL ENGINEERS, STRUCTURES AND MATERIALS CONFERENCE, 7TH, COCOA BEACH, FLA., APRIL 18-20, 1966. TECHNICAL PAPERS. [A66-27986 14-32]
New York, American Institute of Aeronautics and Astronautics, 1966, p. 328-336. 12 refs.

Discussion of selected subjects related to structural dynamics problems of manned space flight for both the liftoff and space flight phases. During launch such dynamic environmental factors as engine noise, buffet, "Pogo" (a longitudinal vibration of the launch vehicle resulting from coupling of the structure with the engine, pump, and fuel feed system), wind and gusts, pilot control, and abort loads may be significant. During space flight, there may be dynamic disturbances due to docking, fuel motion under near-zero g, and man's motion effects on delicate instruments which require high pointing accuracy such as an orbiting telescope. A brief examination of man's characteristics as a dynamical system is made, followed by discussion of the space machine in which he must operate. The ability of an astronaut to control a launch vehicle from liftoff through the time at which he experiences maximum load is discussed, and it is shown that with a small amount of control assistance he can do an excellent job. F. R. L.

A66-28412 #
OPTIMIZATION OF CREW COMFORT SYSTEM.
John R. Malcolm and Roland K. Moir (Boeing Co., Seattle, Wash.).
IN: THE CHALLENGE OF SPACE; PROCEEDINGS OF THE THIRD SPACE CONGRESS, COCOA BEACH, FLA., MARCH 7-10, 1966. [A66-28401 14-30]
Congress sponsored by the Canaveral Council of Technical Societies. Cocoa Beach, Fla., Canaveral Council of Technical Societies, 1966, p. 156-172. 6 refs.

Engineering evaluation of the environmental parameters that affect man's comfort during shirtsleeve operation under conditions of weightlessness. Mathematical expressions are developed to relate how the total metabolic heat generated by a crew member is divided among radiation, convection, and evaporation. These expressions include the vehicle design parameters - air temperature, relative humidity, air velocity, and mean radiant temperature (MRT), and the crew-oriented parameters of clothing thermal resistance and effective wetted surface area. It is concluded that the environmental parameters of air velocity, air temperature, clothing thermal resistance, and MRT can be optimized to obtain the least vehicle weight penalty for providing crew comfort during a wide range of activities. The lowest vehicle weight penalty is obtained when the crew wears clothing with the lowest thermal resistance. MRT

control reduces vehicle weight penalty and is required for low-air-velocity systems. Refinements in heat and mass-transfer coefficients will improve the value of the optimization technique. M. F.

A66-28413 #

TRANSIENT THERMAL STUDY OF A SPACE SUIT CLAD ASTRONAUT ON THE MOON.

Robert J. Martin (B. F. Goodrich Co., Aerospace and Defense Products Div., Akron, Ohio).

IN: THE CHALLENGE OF SPACE; PROCEEDINGS OF THE THIRD SPACE CONGRESS, COCOA BEACH, FLA., MARCH 7-10, 1966. [A66-28401 14-30]
Congress sponsored by the Canaveral Council of Technical Societies. Cocoa Beach, Fla., Canaveral Council of Technical Societies, 1966, p. 173-184.
Contract No. NOW-61-0554-C.

Transient thermal analysis of a spacesuit-clad man on the moon. No refrigeration system is considered for his suit, and it is assumed that the only evaporative cooling is that achieved through the saturation of the occupant's exhalation. These restrictions are imposed because the primary concern is to determine whether useful mission times are possible without recourse to special cooling devices. Practicable exposure times are demonstrated for the lunar day. The analysis also shows that extended mission times are easily feasible for the lunar night side. M. F.

A66-28415 #

AN EXPERIMENTAL APPROACH FOR DETERMINING THE SPACE RADIATION HAZARD TO MANNED SPACE FLIGHT.

Dean E. Ewing (USAF, Veterinary Corps., Kirtland AFB, N. Mex.).

IN: THE CHALLENGE OF SPACE; PROCEEDINGS OF THE THIRD SPACE CONGRESS, COCOA BEACH, FLA., MARCH 7-10, 1966. [A66-28401 14-30]
Congress sponsored by the Canaveral Council of Technical Societies. Cocoa Beach, Fla., Canaveral Council of Technical Societies, 1966, p. 201-205.

Determination of the exact danger of the space radiation environment to manned space systems. The discovery of the earth's radiation belts and the presence of other space radiations coupled with the advent of manned spaceflight demanded that the biological hazards thus imposed be carefully and thoroughly studied. A sound experimental program has been formulated which uses a multidisciplinary approach to develop a sophisticated technique for the measurement, interpretation and evaluation of the space radiation environment and its potential danger. This many faceted program includes the use of both manned and unmanned earth satellites, particle accelerators, computer analyses, and sophisticated radiation measuring devices. Examples from this program are given. M. F.

A66-28422 #

A METHODOLOGY TO ANALYZE AND EVALUATE CRITICAL HUMAN PERFORMANCE.

M. A. Barone (Brown Engineering Co., System Engineering Dept., Human Factors Branch, Huntsville, Ala.).

IN: THE CHALLENGE OF SPACE; PROCEEDINGS OF THE THIRD SPACE CONGRESS, COCOA BEACH, FLA., MARCH 7-10, 1966. [A66-28401 14-30]
Congress sponsored by the Canaveral Council of Technical Societies. Cocoa Beach, Fla., Canaveral Council of Technical Societies, 1966, p. 270-283.

Presented in this paper is a methodology to evaluate, analyze, and predict critical human performance. The methodology is a novel approach toward evaluating potential human error. The aim of the Critical Human Performance and Evaluation (CHPAE) Program is to develop a methodology to control and minimize the natural subjectivity associated with evaluation programs. The typical approach of the CHPAE is to: (1) analyze the system or task, (2) select evaluation factors, (3) establish and prevalidate a rating manual or check list, (4) perform an analysis and evaluation, (5) estimate potential error probabilities, and (6) perform critical comparison studies. Much work still remains to be done toward a complete and final validation of the program - partly because there is a variety of methods both computerized and manual that can be applied to quantify the evaluations and partly because of the need of large population statistics, other than experimental or selected source data to validate the error potential prediction of the plan. Regardless of the early limitations of the metric, the plan will perform a valuable human factors evaluation of a group of tasks, subsystems, or systems. (Author)

A66-28480

INDIVIDUAL DIFFERENCES IN VIGILANCE PERFORMANCE.

Donald N. Buckner, Albert Harabedian, and James J. McGrath (Human Factors Research, Inc., Santa Barbara, Calif.).

Journal of Engineering Psychology, vol. 4, no. 3, 1965, p. 69-85. 12 refs.
Contract No. Nonr-2649(00).

Study of individual differences in the performance of a vigilance task. Such factors are investigated as the magnitude of individual differences in vigilance, the reliability of individual differences both within a watch and from one watch to the next, the relationship between the performances of the same individuals on a visual and on an auditory vigilance task, and the relationship between the performances of the same individuals under alerted and ordinary watch-standing conditions. Records obtained during each watch period made three response indices available for the analyses: correct detection of the signal, false detections, and latencies of response. B. B.

LC ENTRIES

A66-81231
INVESTIGATION ON THE CIRCULATION IN JET PILOTS [KREISLAUF-UNTERSUCHUNGEN BEI JETFLIEGERN].
H. Schwalb and J. Eberl (Munchen U., Inst. für die Prophylaxe der Kreislaufkrankh., West Germany).
Wehrmedizin, vol. 4, Jan. 1966, p. 15–24. 15 refs. In German.

The kymographic heart volume, blood pressure at rest and during ergometer work, the maximum oxygen pulse, and the stroke volume/maximum oxygen pulse ratio was established in 110 jets pilots between 23–49 years of age. One hundred and sixty healthy men of the general population, not engaged in sports or physical labor, between 20 and 50 years of age, were used as a comparison. The two groups showed no substantial difference with regard to heart volume and cardiocirculatory capacity. The circulatory capacity reserves of jet pilots can generally be designated "average"; as was to be expected they showed significant individual fluctuations according to physical activity. Due to the low degree of physical exercise, the physical training condition was in most test persons only moderate. There was a relatively high percentage of slightly increased rest blood pressure values or hypertensive blood pressure reactions in jet pilots during physical work. The sphygmographically established pulse wave rate in the aorta-iliaca area in jet pilots showed no difference as compared to the controls. Some of the jet pilots examined revealed relatively high serum cholesterol and neutral fat values. Significance of physical work, heavy cigarette smoking, and the increased stress due to flying is discussed.

A66-81232
VESTIBULOSPINAL REFLEXES. IX. ALTERATIONS IN THE STEPPING TEST DURING ALCOHOL INTOXICATION.
Erik Peitersen (U. Hosp., Dept. of Otolaryngol., Copenhagen, Denmark).
Archives of Otolaryngology, vol. 83, Apr. 1966, p. 332–334. 14 refs.

Ten normal persons were investigated by the stepping test before as well as 20 and 55 minutes after the intake of alcohol. A blood concentration of 0.040% and 0.080% alcohol was the aim, and the obtained concentrations averaged 0.043 and 0.084%. The subjects' rotation angle on their own axis increased significantly from spontaneous 58° to 20 minutes 85° and 55 minutes and 132° as mean values. The forward movement did not show significant alterations, whereas sideways movements increased. The direction of rotation was not affected. All the subjects exhibited a very slight unsteadiness after administration of alcohol. By the stepping test it is possible to demonstrate alterations in the rotation angle on the subject's own axis at the same low blood concentrations of alcohol at which positional nystagmus is demonstrable by electronystagmography.

A66-81233
MILITARY AND SPACE SHORT-TERM INHALATION STANDARDS.
Henry F. Smyth, Jr. (Mellon Inst., Pittsburgh, Pa.)
(Ind. Hyg. Found., 30th Ann. Meeting, Pittsburgh, Oct. 20–21, 1965).
Archives of Environmental Health, vol. 12, Apr. 1966, p. 488–490.

The short-term inhalation standards which the National Academy of Sciences—National Research Council Committee on Toxicology has recommended for the guidance of military and space agencies are presented. The contaminants involved include oxygen difluoride, fluorine, monomethyl hydrazine, hydrogen fluoride, hydrogen chloride, nitrogen dioxide, sulfur dioxide, unsymmetrical dimethyl hydrazine, carbon disulfide, hydrogen sulfide, and carbon monoxide. These standards are designated Emergency Exposure Limits, the same designation applied to the American Industrial Hygiene Association standards. The concepts of the two sets of standards appear to be essentially identical. In most instances the numerical values are identical. They are intended to be applied to planning operating conditions so that an accident which may occur at an unpredictable time cannot expose a worker to a dangerous concentration. They are not appropriate for exposures which are certain to occur at predictable times.

A66-81234
BIOLOGIC EFFECTS OF NITROGEN DIOXIDE IN RELATION TO AIR QUALITY STANDARDS.
W. Clark Cooper and Irving R. Tabershaw (Calif. U., School of Public Health, Div. of Environ. Health Sci., Berkeley).
Archives of Environmental Health, vol. 12, Apr. 1966, p. 522–530. 55 refs.

Data on the biologic effects of nitrogen dioxide on man and lower animals over a wide range of concentrations are reviewed and tabulated. Present evidence suggests that long-continued exposures should not exceed the range 0.5–1 p.p.m. This is based on the evidence of increased mortality in lower animals exposed to aerosolized microorganisms after NO_2 exposures and the pathologic effects demonstrable in animals continuously exposed to levels in the range of 4–5 p.p.m. Brief exposures of a general population should not exceed 3 p.p.m. over a period of one hour. This is based on the possible potentiation of infections and on the odor threshold. The above recommendations relate to the possible effects of NO_2 on health alone. They do not consider potentiation or additive effects nor any contributions to plant damage and visibility.

A66-81235
THE EFFECT OF CUTANEOUS VIBRATION ON WEIGHT LOSS.
Dale M. J. P. Atrens (Hollins Coll., Hollins College, Va.)
Psychonomic Science, vol. 4, Mar. 5, 1966, p. 281–282. 13 refs.

The local administration of 1 hour of cutaneous vibration through the locomotion surface contact extremities of 10 white rats produced a marked loss (over 2%) in gross body weight. The weight losses which were significantly greater ($p<.01$) than two control groups could not be accounted for by an increase in activity. After examining several alternate views, the author postulates a facilitating effect on the catabolism of fatty tissue to explain the effect.

A66-81236
CARDIOVASCULAR RESPONSES TO EXERCISE FOLLOWING MYOCARDIAL INFARCTION.
John Naughton, Kamal Shanbour, Robert Armstrong, John McCoy, and Michael T. Lategola (Okla. U., Med. Center, Dept. of Prevent. Med. and Public Health, Biostatist. Unit and Neurocardiol. Res. Program, Dept. of Med. and FAA, Civ. Aeromed. Res. Inst., Oklahoma City).
Archives of Internal Medicine, vol. 117, Apr. 1966, p. 541–545. 5 refs.

Thirty-six men, 24 with well-documented episodes of myocardial infarction and 12 presumably healthy, performed a work capacity test while sedentary. All of them were reevaluated eight months later after 12 of the cardiac patients had participated in a physical conditioning program and the remainder had remained sedentary. There we e significant training effects in the exercising cardiacs as reflected by the systolic and diastolic blood pressures and pulse rate during rest, standing, and comparable levels of energy expenditure. No differences were observed between tests in either the sedentary cardiac or sedentary healthy men. The response to physical stress was similar in cardiacs to that observed in the healthy men indicating that the presence of disease did not necessarily affect the physiologic response of the subjects.

A66-81237
EVALUATION OF MYOCARDIAL STATE BY SYNCHRONIZED RADIOGRAPHY AND EXERCISE.
William J. Phillips, Hugh B. Higginbotham, Herbert Frerking, and Robert Paine (St. Luke's Hosp., Dept. of Med., St. Louis, Mo.)
New England Journal of Medicine, vol. 274, Apr. 14, 1966, p. 826–829. 19 refs.
Adolph B. Hill Med. Fund and Mallinckrodt Chem. Co. supported research.

Observation of the immediate effects of exercise upon radiographically determined systolic cardiac size revealed that the normal heart regularly decreases in transverse diameter whereas the heart in most patients with ischemic myocardial disease either shows no change or actually increases in size. The procedure appears to be a reliable technique in the clinical study of myocardial disease, capable of revealing disease when the conventional measures have failed and reflecting the status of the heart muscle in the presence of valvular and conduction disorders. The diseased myocardium resembles the denervated heart in hemodynamic behavior and in decreased content and binding of norepinephrine.

A66-81238
THE ACTION OF ETHYL ALCOHOL ON THE PERIPHERAL NERVES.
O. A. Peiris, D. W. Miles, and W. N. Anderson (Leeds U., Great Britain).
American Journal of the Medical Sciences, vol. 251, Feb. 1966, p. 207–210. 5 refs.

Studies on motor nerve conduction before and after the ingestion of alcohol were carried out in 17 normal volunteers. It was observed that blood alcohol levels of between 50 and 130 mg. per 100 ml. produced no significant effect on motor nerve conduction, provided that the temperature was adequately controlled. The importance of temperature control in nerve conduction studies is stressed.

A66-81239
AVERAGE EVOKED POTENTIALS AND REACTION TIMES TO VISUAL STIMULI.
E. Donchin, and D. B. Lindsley (Calif. U., Brain Res. Inst. and Depts. of Psychol. and Physiol., Los Angeles).
Electroencephalography and Clinical Neurophysiology, vol. 20, Mar. 1966, p. 217–223. 22 refs.
NASA Contract NsG-623 and Grant NSF GB-1844.

Average evoked potentials to brief light flashes were recorded from occipital, vertex, temporal, and orbital leads in ten subjects during a reaction time study. Subjects performed under two conditions, with and without

knowledge of results. The amplitude of the average evoked potentials was related to reaction time. For any given sequence of reaction times, faster reactions were associated with larger amplitude average evoked potentials. Knowledge of results shortened reaction times and increased the magnitude of average evoked potentials. The diffuse and non-specific character of the main component of the average evoked potential appears to reflect changes in cortical excitability associated with the variability of reaction time. This result has been interpreted in relation to the non-specific arousal and alerting mechanism.

A66-81240
SLEEP PATTERNS IN THE YOUNG ADULT FEMALE: AN EEG STUDY.
Robert L. Williams, Harman W. Agnew, Jr., and Wilse B. Webb (Fla. U., Coll. of Arts and Sci., Dept. of Psychol. and Coll. of Med., Dept. of Psychiat., Gainesville).
Electroencephalography and Clinical Neurophysiology, vol. 20, Mar. 1966, p. 264–266.
Contract AF-AFOSR-395-65 and Grant NIH FR-0536201.

In this study of the sleep of young females, additional support was found for the hypothesis that an individual spends a characteristic amount of time in each sleep stage. The length of stages was short, usually ten minutes. These stage changes were usually smooth, moving from one stage to the next when sleep was deepening, but less smooth during arousal from deeper levels. Stages IV and III showed their greatest amounts during the first third of the night and 1-rapid eye movement state (REM) during the last third. Comparisons between this group of young females and a group of males in the same age range revealed no significant differences for these electroencephalographic parameters of sleep.

A66-81241
A DEVICE FOR THE PARTIAL RESTRAINT OF RATS IN OPERANT CONDITIONING STUDIES.
Robert D. Hall, Richard J. Clayton, and Roger G. Mark (Mass. Inst. of Technol., Cambridge).
Journal of the Experimental Analysis of Behavior, vol. 9, Mar. 1966, p. 143–145. 9 refs.
NASA Grant NsG-496; Contract DA36-039-AMC-03200(E); Grants NSF 2495 and NIH MH-04737-05.

A brass and Plexiglas, partial restraint device for rats for use in operant conditioning studies is described and illustrated. The lever-pressing situation allows only the rat's head and one foreleg free to move to any appreciable extent. Its advantages include: (1) simple and rigid construction, (2) ease with which animals may be inserted, (3) use for extended periods of time, (4) control of operant behavior, and (5) accessibility of most of the animal's body, especially the head, for studies concerned with the electrical activity of the brain or those which employ electrical or chemical intracranial stimulation. For aversive conditioning procedures, electric shock can be applied to the tail by means of the two electrodes in a small box at the rear of the restrainer.

A66-81242
VESTIBULAR ORIGIN OF THE RAPID EYE MOVEMENTS DURING DESYNCHRONIZED SLEEP.
O. Pompeiano and A. R. Morrison (Pisa U., Ist. di Fisiol. and Consiglio Nazl. delle Ric., Centro di Neurofisiol. e Gruppo d'Elettrofisiol., Pisa, Italy).
Experientia, vol. 22, Jan. 15, 1966, p. 60–61. 5 refs.
Grant PHS NB-02990-04.

During desynchronized sleep in normal cats two kinds of ocular movements were observed: (1) the bursts of rapid eye movement (REM), and (2) the slower, non-conjugate movements, occurring sporadically and intervening between REM. Bilateral lesions of vestibular nuclei did not alter sleep–wakefulness phases, or synchronized and desynchronized sleep, but completely abolished the REM bursts. Only rare and isolated jerks of the eyes were noted. The phase of deep sleep was characterized by desynchronized electrocortical activity and complete relaxation of the posterior cervical muscles. Complete cerebellectomy and/or bilateral section of the eighth nerve did not affect REM. The changes in REM were, therefore, due to destruction of second-order vestibular neurons, and depended on the loci of lesions. In intact animals the activity of synchronous and desynchronous sleep was recorded from different vestibular nuclei. The results of experiments in this case show that medial and descending vestibular nuclei are of critical importance in REM.

A66-81243
STRESS IN SUBJECTS UNDERGOING SLEEP DEPRIVATION.
Edward J. Kollar, Grant R. Slater, James O. Palmer, Richard F. Docter, and Arnold J. Mandell (Calif. U., Center for Health Sci., Neuropsychiat. Inst., Dept. of Psychiat., Los Angeles).
Psychosomatic Medicine, vol. 28, Mar.–Apr. 1966, p. 101–113. 36 refs.
Grants Calif. Dept. of Mental Hyg. 60-2-18 and 61-2-22 and NIH NB-03556.

Psychological physiological, and biochemical studies were conducted on 4 healthy young-adult males while they underwent 120 hr. of sleep deprivation. The subjects quickly formed a group and dealt with this contrived stress in much the same way that groups cope with stressful environment. Although it is concluded that sleep deprivation is stressful, our measurements did not show an adrenocortical activation. The question of the psychotogenic potency of sleep deprivation is reviewed and it is concluded that sleep deprivation per se is not an adequate stimulus for the production of psychosis.

A66-81244
CHANGES IN LIVER AND MUSCLE GLYCOGEN PRODUCED BY SEVERE WALKING EXERCISE, AND BY FASTING, IN THE RAT [LES VARIATIONS DU GLYCOGENE HEPATIQUE ET MUSCULAIRE AU COURS DE LA MARCHE FORCEE ET DU JEUNE CHEZ LE RAT].
Daniel Rohr, Madeleine Saint-Saens, and Hugues Monod (C.N.R.S., Lab. de Physiol. du Travail, Paris, France).
Journal de Physiologie, vol. 58, no. 1, Jan–Feb. 1966, p. 5–19. 34 refs.
In French.

Liver glycogen and muscle glycogen were measured in 324 rats, at rest, at different times during starvation, during walking of a treadmill, or in the period following exercise. The rats' liver glycogen was almost completely exhausted after 28 hours of starvation, or after 4 hours of walking against load, but was replaced after 16 to 18 hours. The glycogen content of the active muscles fell to a certain extent during starvation, but much more so during muscular work. The fall in muscle glycogen was proportional to that of liver glycogen. After exhaustion of liver glycogen, 4 hours of walking against load was still possible. While liver glycogen plays a large part in the control of the blood sugar, its importance from the point of view of energy output of muscular work appears to be limited. The part played by carbohydrates during work is discussed.

A66-81245
EFFECT OF ACUTE COLD EXPOSURE OF ANIMALS ON THE PHOSPHORYLASE ACTIVITY IN HEART.
Naranjan S. Dhalla (Pa. U., School of Med., Dept. of Pharmacol. and Pittsburgh U., School of Med., Dept. of Pharmacol., Pa.)
Life Sciences, vol. 5, Mar. 1966, p. 485–493. 21 refs.

Acute cold exposure of rats and rabbits at 4°C. increased phosphorylase a activity in the myocardium. In adrenalectomized or adrenal demedullated rats, the levels of cardiac phosphorylase a were not different from those in normal rats; however, exposure of such animals to cold failed to elevate the enzyme activity in the heart. Pretreatment of rats with nethalide hydrochloride decreased the phosphorylase a activity as well as abolished the effect of cold exposure. When the rats and rabbits were treated with reserpine, the cardiac phosphorylase activity was decreased but the action of cold exposure was not altered. Unlike guanethidine sulfate, bretylium tosylate was unable to decrease the phosphorylase a activity in rabbit heart and the animals treated with these agents showed an increase in enzyme activity in response to cold. The results indicate that in emergency conditions such as cold exposure, the heart phosphorylase is mainly influenced through the release of catecholamines from adrenal medulla.

A66-81246
WE ARE NOT ALONE: THE SEARCH FOR INTELLIGENT LIFE ON OTHER WORLDS.
Walter Sullivan.
New York, McGraw-Hill Book Co., 1966, xi+ 325 p. refs.
$6.95.

This text written for readers with a minimum scientific background, incorporates historical and explanatory discussions of our galaxy, a review of theories of the origin of life and basic molecules of living organisms, a summary of problems posed by meteorites, the possibility of life on Mars, and a presentation of results in the perception of intelligent radio signals from space.

A66-81247
THE ACTUAL EPIDEMIOLOGICAL SITUATION AND POSSIBLE PROJECTIONS CONCERNING THE FUTURE DEVELOPMENTS OF SOME QUARANTINABLE DISEASES IN THE WORLD (PLAGUE, CHOLERA, SMALLPOX) [SITUAZIONE EPIDEMIOLOGICA ATTUALE E POSSIBILI PREVISIONI CIRCA IL FUTURO DESTINO DI ALCUNE MALATTIE QUARANTENARIE NEL MONDO (PESTE, COLERA, VAIOLO)].
V. Del Vecchio and G. Lalli (Rome U., Ist. d'Igiene, Italy).
IN: SIXTH INTERNATL. AND TWELFTH EUROPEAN CONGR. OF AVIATION AND SPACE MED., ROME, OCT. 1–5, 1963: LECTURES, VOL. I. [Rome, 1965], p. 3–328. 278 refs. In Italian.

An extensive worldwide epidemiological study is presented of plague, cholera, and smallpox, including maps, tables, graphs and bibliographies. Current programs of eradication and quarantine practices of these diseases are examined, and preventive measures are proposed for future implementation. Cholera and smallpox present no epidemiological problem and are considered in terms of incidence and eradication programs. The importance

of international air traffic in the dispersion of smallpox is discussed along with the international sanitary regulations of the World Health Organization for quarantine practice in international traffic.

A66-81248
PRACTICAL APPLICATION IN AVIATION OF QUARANTINE MEASURES OF THE WORLD HEALTH ORGANIZATION [APPLICATION PRATIQUE POUR L'AVIATION DES MESURES QUARANTINAIRES DE L'ORGANISATION MONDIALE DE LA SANTE].
A. Allard (Sabena, Serv. Med., Brussels, Belgium).
IN: SIXTH INTERN. AND TWELFTH EUROPEAN CONGR. OF AVIATION AND SPACE MED., ROME, OCT. 1-5, 1963: LECTURES. VOL. I. [Rome, 1965], p. 343-349. In French.

In keeping with the decisions of the World Health Organization and the Organization of International Civil Aviation, airlines may protect their passengers by explaining the value of obligatory vaccinations; by disinsecting aircraft; by using purified water (preferably chlorinated) aboard aircraft; and by serving hygienically prepared food to passengers. Aircraft personnel should be treated efficiently immediately upon the appearance of an infectious or parasitic disease. It is stressed that periodic medical examination should be made of all personnel along with examination of their equipment, and that vaccination against yellow fever, smallpox, cholera, poliomyelitis, and tetanus should be obligatory. Since modern flight can modify epidemiological data, it is necessary that airlines maintain medical, infirmary, and administrative personnel to evaluate medical data.

A66-81249
INTERNATIONAL SANITARY REGULATIONS AND AIR TRAFFIC.
R. I. Hood (World Health Organ., Geveva, Switzerland).
IN: SIXTH INTERNATL. AND TWELFTH EUROPEAN CONGR. OF AVIATION AND SPACE MED., ROME, OCT. 1-5, 1963: LECTURES. VOL. I. [Rome, 1965], p. 329-341.

The International Safety Regulations of the World Health Organization (WHO), adopted in 1951 and legally in force for practically all states and territories, have proved effective in preventing the international spread of the quarantinable diseases (smallpox, plague, yellow fever, typhus, cholera, relapsing fever). WHO keeps these regulations under review, and keeps abreast of technical advances and changing patterns of world travel. Early notification of new outbreaks is provided via the Epidemiological Intelligence Service. Another WHO service is a Weekly Epidemiological Record which provides up-to-date information on the occurrence of quarantinable diseases in ports and airports, along with other localities. Further improvements are needed for (1) maintaining airport facilities and practices which will prevent the spread of diseases to aircrews and passengers; (2) alerting airport health services; (3) effective control of passengers leaving infected areas; (4) improved airport sanitation, including vector control; and (5) aircraft disinfection.

A66-81250
INTRODUCTION TO THE PROBLEM OF WEIGHTLESSNESS IN SPACE FLIGHT AND OF PASSAGE FROM ACCELERATION TO WEIGHTLESSNESS AND VICE VERSA. SYNTHESIS OF THE RESULTS OBTAINED ON HUMANS AND ANIMALS BY MEANS OF THE SUBGRAVITY TOWER AND AXIS [INTRODUZIONE SUL PROBLEMA DELL'ASSENZA DI PESO NEL VOLO SPAZIALE E DEL PASSAGGIO DALLE ACCELERAZIONI ALL'ASSENZA DI PESO E VICEVERSA. SINTESI DEI RISULTATI OTTENUTI SULL'UOMO E SULL'ANIMALE MEDIANTE LA TORRE E L'ASSE DI SUBGRAVITA.]
T. Lomonaco (Ispettorato di Sanità Aeron., Rome, Italy).
IN: SIXTH INTERN AND TWELFTH EUROPEAN CONGR. OF AVIATION AND SPACE MED., ROME, OCT. 1-5, 1963: LECTURES. VOL. I. [Rome, 1965], p. 353-371. 56 refs. In Italian.

A review is presented of the results obtained from physiological studies on subjects under conditions of a subgravity tower. The apparatus, kinematics, aerodynamic resistance, and characteristics of the sub- and zero-gravity controls of the subgravity tower are described. The various studies cited indicate that in passing from + g to 0 g there appear variations in muscular activity and coordination of body movements which may partly be caused by stimulation of the utricular apparatus. By using the subgravity axis, deambulation of a man at 0 g caused an increase in oxygen consumption of about one-third and an increase in the electrical activity of the muscles used. Both oxygen consumption and electrical activity normalized upon return to normal conditions.

A66-81251
NEUROPHYSIOLOGICAL RESPONSES TO CHANGES OF THE GRAVITATIONAL FIELD AND TO SHORT PERIODS OF ZERO GRAVITY [RESPONSES NEUROPHYSIOLOGIQUES AUX VARIATIONS DUE CHAMP GRAVIATIONNEL ET A DE BREVES PERIODES DE GRAVITATION NULLE]
R. Grandpierre (Centre d'Enseignement et de Rech. de Med. Aeron., Paris, France).
IN: SIXTH INTERN. AND TWELFTH EUROPEAN CONGR. OF AVIATION AND SPACE MED., ROME, OCT. 1-5, 1963: LECTURES. VOL. I. [Rome, 1965], p. 389-398. In French.

Following a brief review of various animal and human experiments dealing with the effects of gravity and weightlessness, a systematic study is presented of the effects of the forces of inertia on electrocortical and reticular activity of rats during centrifugation. The level of acceleration was 2, 5, 8, and 10 g. Functional changes in central nervous system activity appeared at the beginning and at the end of high gravity as shown by the increased amplitude and frequency of recticular and cortical tracings. A state of cortical hyperactivity was found without functional changes. Some animals presented signs of cortical irritability of the epileptic type, which disappeared during centriguation but reappeared during sleep following the experiment. In normal rats cortical and reticular spontaneous electrical activity did not appear to be modified by short periods of subgravity (30-45 seconds) repeated 7-10 times during aircraft flight in which gravity never exceeded 3 g. Electromyographic registrations indicated that in passing into subgravity several clonic muscular contractions of short duration appeared. Two Véronique rocket flights were also made which permitted registration of the duration of weightlessness at 180 and 140 seconds, respectively.

A66-81252
EFFECTS OF WEIGHTLESSNESS ON MAN DURING U. S. SUBORBITAL FLIGHTS.
S. J. Gerathewohl (NASA. Ames Res. Center, Moffett Field, Calif.)
IN: SIXTH INTERN. AND TWELFTH EUROPEAN CONGR. OF AVIATION AND SPACE MED., ROME, OCT. 1-5, 1963: LECTURES. VOL. I. [Rome, 1965], p. 399-415.

The data obtained from Project Mercury M-3, M-4, M-6, M-7, M-8, and M-9 flights were analyzed with regard to the effects of weightlessness on man and the following conclusions were drawn: (1) Weightlessness appears to have no psychological effects on man. (2) Cardiovascular, pulmonary, and metabolic changes were found which may be associated with weightlessness. (3) A mild mineral mobilization resulted in increments of urinary potassium excretion and hypercalcemia. (4) Increases were found in leucocytes, hemoglobin, hematocrit, and monocytes with decreases in blood pH level. (5) Serum and plasma enzyme pre- and postflight tests yielded inconclusive results in most cases. (6) A correlation between duration of weightlessness and response change of cardiac and respiratory rates during reentry stress exists. (7) Orthostatic hypotension and orthostatic tachycardia were observed after the longest flights. (8) All response changes observed during or after flight can be interpreted as symptoms of physical, psychological and situational stress including or regardless of weightlessness, And (9) all abnormalities attributed to weightlessness during the Mercury flights were well within the tolerance limits of the human organism. No psychological or physiological contraindications appeared for embarking on longer spaceflight missions.

A66-81253
ON PROBLEMS CONCERNING LONG PERIODS OF WEIGHTLESSNESS [SUI PROBLEMI DI LUNGHI PERIODI DI ASSENZA DI PESO].
H. J. von Beckh (6571st Aeromed. Res. Lab., Holloman AFB, N. Mex.)
IN: SIXTH INTERN. AND TWELFTH EUROPEAN CONGR. OF AVIATION AND SPACE MED., ROME, OCT. 1-5, 1963: LECTURES. VOL. I. [Rome, 1965], p. 429-434. 30 refs. In Italian.

A brief review is presented of animal and human experiments, with results, concerning the following physiopathological problems encountered during weightlessness: (1) temporary decrease of neuromuscular coordination; (2) appearance of the oculogravic illusion; (3) disorientation; (4) airsickness; and (5) digestive problems. Consideration is also given to experiments dealing with cardiovascular problems occurring during launch (ante-zero-g accelerations) and during re-entry into the atmosphere (post-zero-g accelerations).

A66-81254
DISORIENTATION, TIME PERCEPTION AND ISOLATION.
T. C. D. Whiteside (R.A.F. Inst. of Aviation Med., Farnborough, Hants, Great Britain).
IN: SIXTH INTERN. AND TWELFTH EUROPEAN CONGR. OF AVIATION AND SPACE MED., ROME, OCT. 1-5, 1963: LECTURES. VOL. I. [Rome, 1965], p. 469-475.

In an attempt to verify the hypothesis that the length of a time period is judged by the number of memorable events occurring in a given time space, 16 persons were separately exposed to the following four isolated experimental conditions in turn: doing nothing, doing jigsaw puzzle, listening to a story, reading aloud. Twelve subjects, not knowing there were only four conditions, underestimated the total duration of the experiment. Analysis of variance on the time estimates of 16 subjects showed no significant effect attributable to either the particular experimental condition or the order in which the four conditions were presented. The subjects seemed to cluster

their estimates of time in varying positions. Some tended generally to underestimate, the others to over-estimate the time. The data indicate that when listening to an interesting story the time seemed longer than either of the three other conditions. This finding is in agreement with the hypothesis that the length of time periods depends on the number of memorable events and is related only indirectly to interest of the situation.

A66-81255
PSYCHOLOGICAL PROBLEMS OF SPACE FLIGHT [PROBLEMI DI PSICOLOGIA DEL VOLO SPAZIALE].
L. Ancona (U. Cattolica del Sacro Cuore, Ist. di Psicol., Milano, Italy).
IN: SIXTH INTERN. AND TWELFTH EUROPEAN CONGR. OF AVIATION AND SPACE MED., ROME, OCT. 1-5, 1963: LECTURES. VOL. I. [Rome, 1965], p. 477-487. In Italian.

A critical review is presented of the research of various authors concerning the problems of sensory and perceptual deprivation in the space cabin. Sensory deprivation reduces sensory data, impairs mental function, motor ability, and initiative, and may lead to hallucinations, which can greatly impair a space mission. For successful space missions, astronauts should be selected who possess the following psychological characteristics: (1) high level of general intelligence; (2) adequate energy and maturity; (3) free from anxiety; (4) show no overdependence in the satisfaction of basic needs; (5) function adequately under ordinary conditions; (6) flexible behavior; (7) interest in mission with personal hyper-compensative motivations; and (8) lack impulsiveness.

A66-81256
CINERADIOGRAPHIC OBSERVATIONS OF HUMAN SUBJECTS DURING TRANSVERSE ACCELERATIONS OF + $5G_x$ and + $10G_x$.
Harold Sandler (U.S. Naval Air Develop. Center, Aerospace Med. Res. Dept., Johnsville, Warminster, Pa.)
(Aerospace Med. Assoc. Meeting, New York, N. Y., Apr. 1965).
Aerospace Medicine, vol. 37, May 1966, p. 445-448. 16 refs

X-ray motion pictures were recorded for five human subjects during transverse accelerations of + $5g_x$ and + $10g_x$ on the Johnsville centrifuge. Quantitative measurements of change in A-P chest diameter and heart position were made from photographic prints of the films. A slight but significant posterior displacement of heart position could be demonstrated when compared to change in the A-P chest diameter.

A66-81257
OBSERVATIONS ON MAN IN AN OXYGEN-HELIUM ENVIRONMENT AT 380 MM. Hg TOTAL PRESSURE: I. CLINICAL.
Howard J. Zeft, Frode Ulvedal, E. G. Shaw, B. E. Welch (USAF School of Aerospace Med., Environ. Systems Branch, Brooks AFB, Tex.), Victor S. Behar (Duke U. Med. Center, Durham, N. C.), and David G. Quigley (R. I. Hosp., Providence).
Aerospace Medicine, vol. 37, May 1966, p. 449-453. 28 refs.
nasa supported research.

The effects of a 15-day exposure to an environment with a PO_2 of 165.4 mm. Hg and a P_{He} of 205.5 mm. Hg at 379.9 mm. Hg total pressure have been studied in four men. Initially, all developed conjunctivitis associated with decreased relative humidity which cleared by increasing water vapor pressure. One individual was removed from the chamber prior to completion of the experiment because of the unrelated development of an acute prostatitis. No hematologic, electrolyte, or liver function abnormalities were noted. Stress testing showed some deconditioning from confinement. From this limited study, there appears to be no medical contraindication to the use of this environment for future space cabin atmospheres.

A66-81258
OBSERVATIONS ON MAN IN AN OXYGEN-HELIUM ENVIRONMENT AT 380 MM. Hg TOTAL PRESSURE: II. RESPIRATORY.
W. G. Robertson, H. J. Zeft, B. E. Welch (USAF School of Aerospace Med., Environ. Systems Branch, Brooks AFB, Tex.), and V. S. Behar (Duke U. Med. Center, Durham, N. C.)
Aerospace Medicine, vol. 37, May 1966, p. 453-456. 19 refs.
NASA supported research.

The pulmonary effects of a 2-week exposure to a helium-oxygen atmosphere at a total pressure of 380 mm. Hg were evaluated in four healthy young men. Oxygen consumption, carbon dioxide production, alveolar ventilation, dead space, and alveolar gas tensions were determined. The various lung compartments including residual volumes were measured. In addition, vital capacities and maximum breathing capacities were studied. Carbon monoxide diffusing capacities were measured just prior to exposure to the oxygen-helium atmosphere and immediately upon descent from altitude. All other studies were carried out during a 14-day pre-experimental control period, 15-day experimental exposure, and a 6-day post-experimental period. Results are discussed with reference to the physical characteristics of helium. An analysis of the effects of the decreased density of the inspired gas mixture is presented.

A66-81259
OBSERVATIONS ON MAN IN AN OXYGEN-HELIUM ENVIRONMENT AT 380 MM. Hg. TOTAL PRESSURE: III. HEAT EXCHANGE.
W. L. Epperson (Williams AFB, Ariz.), D. G. Quigley (R. I. Hosp., Providence), W. G. Robertson, B. E. Welch (USAF School of Aviation Med., Environ. Systems Branch, Brooks AFB, Tex.), and V. S. Behar (Duke U., Med. Center, Durham, N. C.)
Aerospace Medicine, vol. 37, May 1966, p. 457-462. 17 refs.
NASA supported research.

Four male subjects were exposed to an atmosphere of helium (205.5 mm. Hg) and oxygen (165.4 mm. Hg) at a pressure of 379.9 mm. Hg for a period of two weeks and to an atmosphere of 579.3 mm. Hg helium and 159 mm. Hg oxygen at 760 mm. Hg for one day. Body temperatures, environmental temperatures, body weights, and metabolic heat were determined both at rest and at exercise. From these data the thermal balance of each subject was calculated. Differences in both skin temperatures and heat balance were seen between the experimental environments and ground-level air. In particular, heat loss by convection was increased and heat loss by evaporation was reduced in the 579.3 mm. Hg helium condition. A theoretical consideration of convective heat exchange is presented.

A66-81260
PHYSICAL CONDITIONING VERSUS + Gz TOLERANCE.
Kenneth H. Cooper and Sidney Leverett, Jr. (USAF Hosp., Aerospace Med. Lab., Lackland AFB, Tex.)
Aerospace Medicine, vol. 37, May 1966, p. 462-465. 18 refs.

An attempt was made in this study to determine the effect of endurance training on + g_z tolerance in experienced centrifuge subjects. Eleven subjects were divided into six exercisers and five controls. For three months the exercisers engaged in a daily (5 times a week) progressive running program while the controls were asked to avoid vigorous exercise. Frequently during this period, all eleven subjects were subjected to both rapid onset and gradual onset runs on the USAF School of Aerospace Medicine centrifuge. At the conclusion of the three months, significant differences were noticed between the exercise and control groups in endurance capacity as indicated by an increase in maximal oxygen consumption. However, no significant difference was noted between the groups in their ability to tolerate positive g_z during either gradual or rapid onset centrifuge runs. In this study neither an increase nor a decrease in g_z tolerance could be correlated with endurance capacity.

A66-81261
EFFECTS OF LOWER BODY NEGATIVE PRESSURE ON PHYSIOLOGIC CHANGES DUE TO FOUR WEEKS OF HYPOXIC BED REST.
Paul M. Stevens, Perry B. Miller, Theodore N. Lynch, Charles A. Gilbert, Robert L. Johnson, and Lawrence E. Lamb (USAF School of Aerospace Med., Internal Med. Branch, Brooks AFB, Tex.)
Aerospace Medicine, vol. 37, May 1966, p 466-474. 15 refs.

The effects of hypoxia and lower body negative pressure (L.B.N.P.) on blood volume, orthostatic and physical tolerance were studied in 22 subjects maintained at bed rest for 4 weeks at simulated altitudes of 10,000 and 12,000 feet. No significant differences in results were noted between the two altitudes. Hematocrits increased significantly by 7.2 per cent. Plasma volume decreased (610-637 cc.) while the calculated red cell mass either increased slightly or remained unchanged (133-39 cc.). This suggests that hypoxia prevents the loss in red cell mass, but has no influence on the loss of plasma volume that occurs during bed rest at ground level; furthermore the erythropoietic response to hypoxia seems to be decreased by bed rest. A significant decrease in calculated red cell mass occurred during ambulation following bed rest but not during exposure to L.B.N.P. while at continued bed rest. Exposure to L.B.N.P. during the last 2 days of bed rest repleted plasma volume and prevented subsequent orthostatic intolerance. In response to a given exercise load the heart rate was much higher if the plasma volume was decreased but unchanged if the plasma volume was re-expanded by L.B.N.P. Maximum oxygen consumption was decreased in all subjects following bed rest regardless of their blood volumes.

A66-81262
AN ON-LINE SYSTEMS FOR MEASURING RESPIRATORY PARAMETERS USING A HYBRID ANALOGUE DIGITAL COMPUTING SYSTEM.
J. Q. Durfey (Baylor U. Coll. of Med., Div. of Anesthesia, Houston, Tex.) and M. N. Leeming (Mem. Sloan-Kettering Cancer Inst., New York, N. Y.)
(Aerospace Med. Assoc. Meeting, New York, N. Y., April 1965).
Aerospace Medicine, vol. 37, May 1966, p. 474-478. 18 refs.
Grants NIH HE 08186

Work was begun approximately six years ago by Bellville and Seed on a system to measure various respiratory parameters using a pneumotachograph, strain gauge, infra-red carbon dioxide analyzer, and an analogue computer with an X-Y plotter read-out. This work was continued by T. W. Murphy, who digitalized the system at the sacrifice of much of the direct readout capabilities. Therefore the system was re-vamped so that both digital and direct analogue/digital readouts were achieved. The system proved successful

in monitoring and instrumentation, as is shown in the text. At present it is undergoing sophistication and redesign so that even greater capabilities may be achieved.

A66-81263
A DOSE-EQUATED PHANTOM FOR SPACE RADIATION RESEARCH.
Benton C. Clark and Joseph F. Janni (AF Weapons Lab., Kirtland AFB, N. Mex.)
Aerospace Medicine, vol. 37, May 1966, p. 479-484. 18 refs.

A rugged dose-equivalent plastic manikin has been fabricated which is suitable for use in space flight. This phantom simulates the interaction of all types of radiation with the geometry of the human body, allowing precise experimental measurements of the depth-dose, linear-energy transfer spectrum, and dosage to critical organs. Dosimeter insertion holes are located in important organs and other appropriate locations within the body. Extensive environmental testing has been done to guarantee the capability of the manikin to withstand the rigors of spaceflight launch and recovery. A complete analysis of the dose equivalency has been performed. The manikin contains every element which composes at least .1 per cent of the human body. The interaction characteristics of the manikin are dose-equated to within 15 per cent for neutrons, and within 10 per cent for photons with energies greater than .04 Mev. The response is within 1.5 per cent for electrons with energy between .05 Mev. and 10.0 Mev., less than 1.2 per cent for protons with energy greater than 1.0 Mev, and within 1.2 per cent for alpha particles of energy greater than 5 Mev.

A66-81264
"WET" VERSUS "DRY" SUIT APPROACHES TO WATER IMMERSION PROTECTIVE CLOTHING.
R. F. Goldman, J. R. Breckenridge, E. Reeves, and E. L. Beckman (U.S. Army Res. Inst. of Environ. Med., Natick, Mass. and U.S. Naval Med. Res. Inst., Bethesda, Md.)
Aerospace Medicine, vol. 37, May 1966, p. 485-487. 13 refs.

Immersion protection flight clothing can be of either a skin diver, "wet" suit type or waterproof, "dry" suit. A waterproofed copper manikin was used to study the insulative properties of both types of suits, in air and also during water immersion. The bulkier characteristics of the dry suit studied, the Mark 5A, provided greater insulation in air than either a 1/4" or 3/16" unicellar sponge, neoprene wet suit. However, during water immersion, compression of the "dry" suit by the water reduced the insulation by 75 per cent. The insulation of the "wet" suits was also reduced but these suits are less compressible and thus during water immersion provide significantly more insulation than the "dry" suit.

A66-81265
METHOD OF RECORDING BODY TEMPERATURE FOR PROLONGED TIME.
Donald L. Tepas and Michael A. B. Vianello (Honeywell, Inc., Systems and Res. Div., Human Factors Group Res. Dept., St. Paul, Minn.)
(Aerospace Med. Assoc. Meeting, New York, N. Y., 1965).
Aerospace Medicine, vol. 37, May 1966, p. 488-491. 14 refs.
U. S. Air Force supported research.

A harness-mounted temperature sensor was developed for prolonged monitoring of human skin temperature. This sensor was 30 inches by 1 inch in size and was mounted in an adjustable harness, which held the sensor in close contact with the chest. Temperature measurements, together with concomitant heart rate readings, were recorded from subjects in the course of 48-hour experimental sessions. The harness proved to be a reasonably comfortable item for the subjects to wear. The temperature measures display many of the characteristics associated with standard body temperature recordings, and the heart rate changes obtained agree with the temperature changes, recorded. The results suggest that this may be a promising technique for monitoring body temperature changes remotely in the course of extended space travel. Additional parametric research is needed to completely assess this approach.

A66-81266
60-DAY EXPOSURE TO ARTIFICIAL ATMOSPHERES.
Fred N. Zeiner (Denver U., Dept. of Zool., Colo.)
Aerospace Medicine, vol. 37, May 1966, p. 492-494. 12 refs.
NASA Grant No. NsG-518

Three laboratory species were subjected to elevated oxygen tensions for 60-day periods, with nitrogen at either high or at minimal levels. No influence of nitrogen could be detected. At 337 mm. oxygen with hamsters and 373 mm. with mice there was no increase in mortality, either during the exposure or following return to the normal altitude environment of Denver. Lung damage was seen, however, at the 300 mm. level and became more severe as oxygen tension was further increased. Rats are more tolerant of elevated oxygen than are mice or hamsters, no lung changes being detectable at the 300 mm. level. It is concluded that higher oxygen tensions may be withstood, and for longer periods, than previously reported.

A66-81267
MODEL FOR THE STUDY OF PSYCHOLOGICAL STRESS.
Robert J. Wherry, Jr. (U. S. Naval School of Aviation Med., Pensacola, Fla.)
(Aerospace Med. Assoc. Meeting, New York, N. Y., April 27, 1965).
Aerospace Medicine, vol. 37, May 1966, p. 495-500. 13 refs.

This paper discusses the need for experimentation in anticipatory physical threat stress and offers a model of the determiners of this type of stress. The major determiners are postulated to be the perceived probability of the occurrence of an unpleasant event, the perceived proximity of the event, and the perceived unpleasantness associated with the occurrence of the event. The paper discusses various problems associated with conducting laboratory research in this area. Problems discussed include (a) finding events for laboratory use which are threatening but safe and ethically acceptable, (b) the necessity for being able to actively control how a subject perceives the laboratory situation, and (c) the measurement of the effects of stress on behavior.

A66-81268
PERFORMANCE OF WATER CONDITIONED SUITS.
D. R. Burton (Roy. Aircraft Estab., Farnborough, Great Britain).
Aerospace Medicine, vol. 37, May 1966, p. 500-504.

An engineering assessment of the performance of a water conditioned suit as a heat exchanger has been made in a series of experiments. The experimental data have been reduced, with the aid of a simple theoretical analysis, to an equation which adequately describes the characteristics of the water conditioned suit, and defines its performance limits. The experimental technique required that each subject chose his rate of cooling according to his own comfort preference. Precise predictions of suit inlet temperature and mass flow cannot be made because of the large observed variation in cooling rate chosen by different subjects. Adjustment of the pipe distribution of the present demonstration suit is recommended to improve the cooling patterns.

A66-81269
VERTEBRAL FRACTURE IN JET AIRCRAFT ACCIDENTS: A STATISTICAL ANALYSIS FOR THE PERIOD 1959 THROUGH 1963, U. S. NAVY.
Channing L. Ewing (U. S. Naval School of Aviation Med., Pensacola, Fla.)
Aerospace Medicine, vol. 37, May 1966, p. 505-508.

Vertebral fracture rate analysis of U. S. naval aircraft accidents in the period fiscal years 1959 through 1963 showed that the highest rates were found in jet aircraft ejections. The F-3 and TF-9J aircraft with multiple catapult seats had significantly higher ejection fracture rates than all other aircraft seat combinations, the sitting height accommodations of both aircraft are below the 70th percentile, and over 94 per cent of all ejections from both aircraft were through the canopy. The combination of the sitting-height disparity between man and aircraft, and high through-the-canopy ejection rate would appear to be a major factor in production of vertebral fracture in the accidents studied.

A66-81270
EARLY DIAGNOSIS OF CARDIOVASCULAR DISEASE AMONG AIR-CREW.
H. W. Kirchhoff and E. A. Lauschner (German Air Force, Inst. of Aviation Med., Furstenfeldbruck, West Germany).
Aerospace Medicine, vol. 37, May 1966, p. 509-514. 8 refs.

During the last few years the Institute of Aviation Medicine of the German Air Force has been working on functional tests which seem to be of great help in detecting cardiovascular disease in an early stage. The following research methods have been used: (1) registration of pulse-rate and blood-pressure under ergometer workload is capable of giving early information on beginning hypertension, (2) spiroergometry indicates a decrease in efficiency, (3) tests under determined hypoxia are useful for the detection of coronary insufficiency, and (4) combined examinations of cardiac efficiency and of the peripheral cardiovascular and respiratory system are helpful in discovering functional disturbances and limitations of the physical efficiency of many different functional regions. If through these functional tests a decrease of efficiency and a beginning of organic damage of the cardiovascular system or regulatory distrubances have been discovered most of the pilots will have to follow a terrain-cure in the Bavarian Alps. The main therapy consists in systematically increasing physical exercise, led and supervised by experienced physicians. The patient has to contribute actively in resuming his health. The success can be objectivated by the functional tests mentioned before. We feel that this form of treatment constitutes a progress and increases the number of aging pilots being maintained on flying status.

A66-81271
A NEW NON-REBREATHING VALVE SYSTEM AND SQUEEZE BAG RESUSCITATOR.
John Q. Durfey (Baylor U. Coll. of Med., Houston, Tex.)
Aerospace Medicine, vol. 37, May 1966, p. 515-517.

An attempt to bypass increased complexity and cost in the design of emergency medical equipment for resuscitation has been made in the development of a new type of squeeze bag resuscitator which can also be used as a mouth-to-mask resuscitator by inexperienced individuals. This resuscitator incorporates an exceptionally fine, non-corrosive, light weight, sterilizable non-rebreathing valve which can easily be assembled and disassembled for cleaning and repair purposes. It has the additional advantages of having no forward or back leaks; very low dead space; virtually no resistance to inspiratory or expiratory flow; extreme reliability and durability under a variety of conditions; and universal adaptation to existing anesthesia and resuscitative equipment. The newly designed bag has built-in protection against hyperventilation, a hand strap for maintaining position, and finger grips. It is hoped that further design of such equipment will allow in-the-field emergency anesthetic possibilities, and that presently anticipated low cost of production and marketing will allow universal availability of such emergency resuscitative equipment where it is vitally needed, and will provide training aids for further education and treatment of patients.

A66-81272
USE OF ICE WATER IN THE TREATMENT OF BURNS.
E. B. Cunningham and Jack L. Harris (Armco Steel Corp., Med. Dept., Middletown, Ohio).
Journal of Occupational Medicine, vol. 8, May 1966, p. 271-272.

The use of immersion in ice water or, when not practicable, the application of ice water compresses, has been most successful as an emergency treatment for burns of thermal, chemical, or electrical origin. Four cases of industrial burns are presented, in which treatment with ice water provided instant and complete relief of pain, with absence of edema, tenderness, and blistering. The treatment is recommended for burns involving limited portions of the body surface.

A66-81273
THE TREATMENT OF CHRONIC COMPLICATIONS OF CERVICAL SPINE INJURIES.
Frederick E. Jackson and Hugo DeLucca (Naval Hosp., Charleston, S. C.).
(Ann. Spinal Cord Injury Conf., XIVth, Toronto, Canada, Oct. 28, 1965)
Military Medicine, vol. 131, May 1966, p. 403-420. 10 refs.

Selected problem cases of severe and disabling neck and extremity pain, often with neurological signs as a sequel of cervical trauma, are presented. It is stressed that months, or even years may elapse following injury to the cervical spine before progressive and disabling signs and symptoms may manifest themsleves. Often a classical hemilaminectomy, removal of herniated disc fragments and/or foramenotomy suffices. In certain cases, however, removal of degenerated cervical discs by an anterior approach, followed by cervical fusion is required. Periodic follow-up clinical and roentgenological examination should be performed on patients who continue to have, or who develop pain or neurological signs following cervical injuries.

A66-81274
EFFECT OF LIVER DISEASE UPON STEROID CIRCADIAN RHYTHMS IN MAN.
Joseph R. Tucci, Rene A. Albacete, and Malcolm M. Martin (Georgetown U. School of Med., Dept. of Pediat. and Med., and Veterans Admin. Hosp., Washington, D. C.)
Gastroenterology, vol. 50, May 1966, p. 637-644. 26 refs.
Grant NIH AMO 4221

Steroid circadian variations were studied in 11 patients with biopsy-proven liver disease and compared with observations in eight normal control subjects. Plasma and urinary unconjugated, plasma conjugated, and urinary total 17-hydroxycorticosteroid (17-OHCS) levels were determined in six consecutive 4-hr. periods. In the patients with liver disease, plasma unconjugated as well as conjugated 17-OHCS levels were within the normal range in the morning. Plasma unconjugated 17-OHCS demonstrated a circadian variation within the broad limits of normal in four of eight patients with liver disease. In the remaining four, peak levels were maintained longer than normal or else the variation was markedly reduced. Plasma conjugated 17-OHCS showed a slower than normal rise and broader peak resulting in inversion of the normal diurnal rhythm in six of the eight patients investigated. The urinary findings reflected the plasma changes. The 24-hr. excretion of free 17-OHCS in the urine was significantly greater than in the normal subjects, whereas total 17-OHCS excretion in contrast was reduced.

A66-81275
INDIVIDUAL PROTECTION OF HEARING FROM THE HARMFUL EFFECT OF INDUSTRIAL NOISE.
M Pražić, M. Gregurič, B. Salaj, and R. Subotić (School of Med., ENT. Dept., Audiol. Center, Zagreb, Yugoslavia).
(Liječnički Vjesnik, vol. 87, no. 4, 1965, p. 409-418).
Medical Journal, vol. 87, no. 4, 1965. p. 23-31. 12 refs.
Translation.

The problems connected with industrial noise and the physiological injuries which it may cause are presented; some of the injuries may be of permanent nature. The factors involved are the intensity and character of the noise and the duration of exposure. Protection from noise damage includes noise-proofing of buildings and devices for individual use, such as helmets, ear-cups, and ear-plugs. The helmets are seldom used in normal industry, because they are designed for high intensity noise found around plants producing atomic weapons, jet planes, etc. The ear-cups and ear-plugs can be used extensively. Three types of ear-cups and two kinds of ear-plugs are presented with graphs showing the attenuation curves. The main problems in using these devices seem to be the lack of cooperation on the part of workers, who find them either uncomfortable or unnecessary. Cooperation can be achieved by careful instructions by physicians and safety officers.

A66-81276
EFFECT OF DIETARY PROTEIN LEVEL PRIOR TO ACUTE STARVATION ON SERUM PROTEINS IN THE RAT.
Jose Mendez and Maria Teresa Menchu (Inst. of Nutr. of Central Am. and Panama, Guatemala).
Journal of Nutrition, vol. 88, Apr. 1966, p. 365-369. 13 refs.
Grants PHDS H-02653 and Nutr. Found. 266.

The effect of acute starvation and refeeding on serum proteins was studied in rats receiving high and low protein diets. The levels for total proteins, albumin and alpha -globulin were significantly lower in the group receiving the low protein diet before starvation. No significant differences were observed in alpha -, beta- and gamma-globulin fractions. During starvation, the rats which had consumed the low protein diet showed a significant increase in total protein and albumin, a decrease in alpha - and gamma-globulin, and no significant change in alpha -, and beta-globulin. The rats fed the high protein diet, on the other hand, showed a progressive and significant decrease in total proteins, alpha - and beta-globulin, an increase in gamma-globulin and no significant change in albumin and alpha -globulin fractions. During refeeding, the rats fed the low protein diet prior to starvation showed a significant decrease in albumin, and an increase in alpha-globulin when refed either diet. The rats fed the high protein diet prior to starvation showed an increase in total proteins and albumin when refed the high protein diet, and an increase in alpha -globulin when refed either diet. The plane of protein nutrition of an animal, therefore, influences the response to acute starvation.

A66-81277
AVIATION AND SPACE MEDICINE [MEDICINA AERONAUTICA E SPAZIALE].
A. S[cano] (Centro di Studi e Ric. di Med. Aeron. e Spaziale, Rome, Italy).
IN: Galileo: Enciclopedia delle Scienze e delle Tecniche, Florence, Sadea Sansoni, Oct. 21, 1965, p. 355-365. In Italian.

A review is presented of the physiopathological problems associated with aerospace medicine which includes the following topics: the effects of altitude; barotrauma; aeroembolism, hypoxia and its effects on respiratory and cardiac function, blood circulation, blood biochemistry, nervous system activity, muscular work, body temperature, metabolism, and renal and glandular function; oxygen inhalation; aircraft cabin pressurization; the problems of acceleration and vibrations; aircraft accidents; parachute jumping; aircraft cabin hygiene, transmission of disease via aircraft and passengers; contraindications for flying; microclimate of the space cabin; feeding in space; hazards of ionizing radiations and meteorites during space flight; problems of weightlessness; and psychophysiological selection and training of aerospace personnel.

A66-81278
CHANGES IN THE ELASTICITY OF ARTERIAL WALLS DURING MUSCLE EXERCISE [IZMENENIE UPRUGO-VIAZKOGO SOSTOIANIIA ARTERIAL'NYKH STENOK V SVIAZI S MYSHECHNOI DEIATEL'NOST'IU].
V. V. Vasil'eva, G. I. Kurliaeva, and N. A. Stepochkina (P. F. Lesgaft Inst. of Phys. Culture, Dept. of Physiol., Leningrad, USSR).
Fiziologicheskii Zhurnal SSSR, vol. 52, no. 2, Feb. 1966, p. 166-171.
11 refs. In Russian.

During physical exercises, lifting weights and knee-bends, the rigidity of the arterial walls was increased not only in areas of the working muscles, but also in the other parts of the body. This rigidity seems to aid the equalization of blood supply to body parts. In most subjects this rigidity was more pronounced in the areas of non-activity. In some cases, the reverse reaction was noted, which may indicate a deficiency of the functional state of the arterial walls.

A66-81279
BLOOD OXYGEN AND CARBON DIOXIDE TENSION IN HYPOXIA, HYPERCAPNIA AND HYPOCAPNIA [O NAPRIAZHENII KISLORODA I UGLEKISLOGO GAZA V KROVI PRI GIPOKSII, GIPERKAPNII I GIPOKAPNII].

E. A. Kovalenko and V. I. Korol'kov.
Fiziologicheskii Zhurnal SSSR, vol. 52, no. 2, Feb. 1966, p. 172-178. 14 refs. In Russian.

The oxygen tension of blood in dogs breathing air was noted to be higher in the jugular vein than in blood taken from the right atrium. The same relationship was observed when the animals were in hypoxic state. During hypoxia the oxygen tension in blood and brain tissues was lower than normal, with a decrease in the carbon dioxide tension in arterial and venous blood of the brain. Breathing hypoxic gaseous mixtures with large amounts of carbon dioxide caused an elevation of oxygen tension in blood and brain tissues. Hyperventilation caused a sharp fall in CO_2 tension and an elevation of O_2 tension in the arterial blood, and a decrease in both gases in the venous blood and the adjacent tissues. This fact is important in anesthesia and artificial respiration.

A66-81280
AN INVESTIGATION INTO THE PARATHYROID ORIGIN OF CALCITONIN.
A. D. Care, W. M. Keynes, and T. Duncan (Rowett Res. Inst., Bucksburn, Aberdeen, Radcliffe Infirmary, Nuffield Dept. of Surg., Oxford, and Roy. Infirmary, Aberdeen, Great Britain).
Journal of Endocrinology, vol. 34, Mar. 1966, p. 299-318. 18 refs.

Hypercalcemic perfusion of the parathyroids of thyroidectomized sheep resulted in a prompt systemic hypocalcemic response but it was impossible to conclude with certainty that this was not merely due to the cessation of parathyroid hormone secretion. Although no effect was observed in acute experiments, cross-transfusion of parathyroid venous plasma during hypercalcemic perfusion of the gland in conscious sheep was followed by a small hypocalcemic response in the two recipient lambs. The time-course of this response was similar to that obtained in sheep following the intravenous injection of extracts of bovine superior parathyroid glands. Pure parathyroid hormone, when injected intravenously in a sheep, also caused an initial hypocalcemia, followed later by hypercalcemia. Similar changes in plasma magnesium concentration accompanied those of plasma calcium concentration as a result of hypercalcemic perfusion of a parathyroid gland or the intravenous injection of bovine parathyroid extracts. It is impossible to conclude with certainty that, in sheep, the parathyroid glands secrete calcitonin in response to the stimulus of hypercalcemia, although the possibility cannot be entirely eliminated.

A66-81281
THE EFFECTS OF INDUCED HYPERCALCEMA ON THE ACTIVITY OF THE PARATHYROID GLANDS.
Marcia C. Schmidt, Anne M. Lewis, Edward D. Bird, and William C. Thomas, Jr. (Fla. U., Coll. of Med., Dept. of Med., Gainesville).
American Journal of Pathology, vol. 48, Mar. 1966, p. 437-449. 37 refs.
Grants NIH AM-01772, A-5172, and 5T5 GM-5004 MSR.

Induced hypercalcemia did not markedly alter certain aspects of parathyroid function as indicated by similar specific activity in the glands of normocalcemic and hypercalcemic dogs after injection of labeled methionine and lysine. These data are consistent with clinical observations that the parathyroid glands are not atrophic in hypercalcemic patients.

A66-81282
COLD-INDUCED STRESS IN RATS AS A FUNCTION OF AGE.
Byron A. Campbell and David C. Riccio (Princeton U., N. J.)
Journal of Comparative and Physiological Psychology, vol. 61, Apr. 1966, p. 234-239. 7 refs.
Grant Natl. Inst. of Mental Health M-1562.

Three experiments were designed to measure the intensity of stress evoked in rats of different ages by immersion in cold water. Experiment 1 showed that survival time of rats immersed in 45 F. water was longest for neonates, shortest for weanlings, and intermediate for adults. Experiment 2 measured colonic temperature and colonic temperature recovery time, and Experiment 3 measured behavioral recovery time in weanling and adult rats following removal from the stressor; initial colonic temperatures were lower and behavioral recovery times were slower in weanling rats, whereas colonic temperature recovery times did not vary with age. Procedures for equating the severity of stress in rats of different ages are suggested.

A66-81283
A NEUROPHYSIOLOGIC MODEL OF DREAMS AND HALLUCINATIONS.
Raul Hernández-Péon (Inst. de Invest. Cerebrales, A.C., Mexico City, Mexico).
Journal of Nervous and Mental Disease, vol. 141, Dec. 1965, p. 623-650. 108 refs.
Contract DA-ARO-49-092-G62 and Grants Natl. Inst. of Mental Health MH-10003-01 and Found. Fund for Res. In Psychiat. 64300.

In this paper, a common neurophysiologic model is proposed which accounts for all the commonly recognized features of dreams and hallucinations. This model assumes the existence of a Dream System identifiable with the brain structures involved in recent memory, and subject to tonic inhibition by the Vigilance System during wakefulness. Similar inhibitory influences operate upon the neurons storing remote memories and upon the limbic structures involved in emotions and motivations. When the Vigilance System is inhibited by the Sleep System responsible for the onset and maintenance of sleep, the activity of the neurons with memory tracings and of the Emotional and Motivational Systems is released. While the neural discharges carrying stored information underlying the manifest content of dreams, the activity from the latter limbic structures underlie the latent content of dreams. Dreaming is initiated when the flow of all those impulses arrive to a highly specialized neural system located in the rostral brain stem which has been termed "Conscious Experience System". This system, where "experienced integration" takes place, would be independent of the overlapping Vigilance System. It becomes active during wakefulness and during "synchronized sleep". Hallucinations are accounted, at least in part, by a failure of the inhibitory influences acting upon the Memory Systems during wakefulness. An evolutionary theory of dreams is proposed in which sensory dominance in waking and dreaming states runs in parallel with the development of teleceptive sensory systems. A cognitive function of dreams is suggested.

A66-81284
EFFECT OF BRIEF SENSORY DEPRIVATION ON FIELD DEPENDENCE.
George R. Jacobson (William and Mary, Coll., Williamsburg, Va.)
Journal of Abnormal Psychology, vol. 71, Apr. 1966, p. 115-118. 20 refs.

To determine whether brief sensory deprivation (SD) would act to decrease perceptrual field dependence, 41 male and female college students were given the Rod and Frame Test (RFT). One half of the group then underwent 1 hr. of SD, after which a 2nd RFT indicated a significant decrease ($p<.01$) in errors of orientation. The control group was given the RFT and their activity was controlled during the 1 hr. interval. Their 2nd RFT showed no significant changes in performance. The post-test error-reduction difference between the 2 groups was significant at $p<.05$. The results were explained on the basis of increases in awareness of bodily sensations and their availability for use in orientation tasks.

A66-81285
ROLE OF THE OTOLITH ORGANS IN THE PERCEPTION OF HORIZONTALITY.
Earl F. Miller, II and Ashton Graybiel (U.S. Naval School of Aviation Med., Pensacola, Fla.)
American Journal of Psychology, vol. 79, Mar. 1966, p. 24-37. 24 refs.
NASA supported research.

The influence of the sensory organs of the inner ear on man's ability to align a visual target with the physical horizontal was measured by a discrete and a continuous method of setting. Both test-methods yielded similar results under all test-conditions. When visual background cues were present, settings of the luminous line target to the horizontal were quite accurate in the normal and 10 labrinthine defective (L-D) subjects placed in three positions: upright, recumbent, and inverted. Removal of empirical visual cues revealed, particularly in the recumbent position, that qualitatively all the subjects perceived the typical lag in onset, relatively slow rotation to the maximal illusion, and rotary autokinesis. Quantitatively, however, there were significant intergroup differences. When upright, the normals were able on the average to maintain their accuracy while the L-D subjects deviated significantly in their settings. Both groups of subjects in the recumbent position perceived the Aubert illusion, but the magnitude of the illusion was considerably less in the normal group. When inverted, both groups were less accurate in the dark but no significant intergroup difference was found. In spite of the fact that there was some overlap in the group distributions of settings obtained in the upright and recumbent positions, indicating other factors were involved, the intergroup perceptual differences are best explained as an effect of loss of otolith function in the L-D subjects. It is concluded that the otolith organs in man act to increase his accuracy in egocentric visual localization at least in the upright and recumbent positions.

A66-81286
A TEST FOR A MAGNETIC EFFECT IN IRRADIATED SEEDS.
A. D. Conger (Temple U., School of Med., Radiation Biol., Philadelphia, Pa.), A. H. Flasterstein (Fla. U., Elec. Eng., Gainesville), and K. Thompson (Brookhaven Natl. Lab., Biol. Dept., Upton, L. I., N. Y.)
Radiation Botany, vol. 6, Apr. 1966, p. 105-109. 9 refs.
Grant AEC AT(40-1)-2579.

A magnetic effect on radiation damage in seeds was sought. Dry dormant barley seeds were X-irradiated, and exposed to uniform permanent magnetic fields (4 to 10 kG) or to dummy magnets (no magnet) in dry air at room temperature. Seeds were exposed in three experiments to magnetic fields for (a) 1 day post irradiation, (b) during irradiation and for 4 days post irradiation and (c) during and for 4 days post irradiation and during the 2-hr. period of water soaking to start germination. These are periods during which many other modifiers profoundly affect radiation damage, and when radiation-induced free radicals are present in the seeds. Seeds were grown for about 10

to 12 days, and height of the first leaf (the well-known seedling height) was used as the criterion of radiation damage. Seedling height was not affected by the magnetic treatments.

A66-81287
EFFECT OF LUNG INFLATION ON PULMONARY DIFFUSING CAPACITY AT REST AND EXERCISE.
John M. Miller and Robert L. Johnson, Jr. (Tex. U., Southwestern Med. School, Dept. of Internal Med., Cardiopulmonary Div., Dallas).
Journal of Clinical Investigation, vol. 45, Apr. 1966, p. 493-500. 32 refs. Grants PHS HE 07744 and HE 06296.

Membrane diffusing capacity increases as the lung volume expands from functional residual capacity (FRC) to total lung capacity (TLC). The increase is proportional to the estimated increase in alveolar surface area and occurs at both rest and exercise. Pulmonary capillary blood volume is little affected by expansion of the lung from FRC to TLC either at rest or exercise. We have compared steady state lung diffusing capacity (D_L) values from other laboratories with single breath D_L values taking lung volume into account. The resting steady state D_{LCO} is lower than the D_{LCO} measured during breath holding. During exercise the steady state and single breath D_{LCO} are similar. Reported values for D_{LO_2} measured by the Lilienthal-Riley technique are lower than the D_{LO_2} calculated from single breath data at rest, but the two methods give similar values for exercise. This implies that measurements of single breath D_{LO_2} at operational lung volume during exercise may be translated into terms of oxygen transport. The discrepancy between the steady state and breath-holding D_L at rest and their similarity at exercise may be explained by postulating that the distribution of ventilation and perfusion with respect to diffusing capacity becomes more uniform from rest to exercise.

A66-81288
ERGONOMICS: MAN IN HIS WORKING ENVIRONMENT.
K. F. H. Murrell.
London, Chapman and Hall, 1965, xviv+ 496 p. refs.
$8.82.

In this textbook on ergonomics, a description of the structure, function, and size of the human body is followed by a consideration of the important ingredients of successful work design in terms of specific work situations. Practical ergonomics includes (1) design factors for equipment layout, seating, instrumental displays, compatibility, and characteristics of controls; (2) environmental factors of temperature, humidity, noise, vision, and vibration; and (3) organizational factors such as methods of investigating and organizing work, inspection, shift work, and age. When equipment is intended for human use it should be designed as a man-machine unit.

A66-81289
THE TRAVELER'S MEDICAL GUIDE FOR PHYSICIANS.
B. H. Kean (Cornell U. Med. Coll., Ithaca, N. Y.) and Harold A. Tucker (Med. Serv., Pago Pago, Tutuila, Am. Samoa).
Springfield, Ill., Charles C Thomas Publisher, 1966, xix+ 421 p. 537 refs.

This textbook is intended to provide, for physicians, in quickly available form, data bearing on medical problems likely or certain to arise before, during, or after returning from overseas travel. Pertinent to airplane flight, the use of drugs in treating motion sickness and dysbarism (barotitis and barosinusitis) is discussed. The section on adaptation to climatic extremes includes an appraisal of acclimatization to high altitudes and the accompanying hypoxia. An appendix on medical criteria for passenger flight (reprinted from Aerospace Medicine and Archives of Environmental Health, Feb. 1961) examines the guiding principles for air travel of normal individuals and patients; operational considerations, such as cabin pressurization, oxygen and emergency equipment, seat belts, training of cabin attendants; and physiological conditions associated with flight, including dysbarism, hypoxia, acceleration, noise, vibration, turbulence, and immobilization. Contraindications to flying are listed according to type of patient and organ system affected.

A66-81290
ACTION OF IONIC RADIATION ON HUMAN FAT. II INFORMATION ON THE ACTION OF X AND GAMMA RAYS ON FAT OF SUBCUTANEOUS ADIPOSE TISSUE [O DJELOVANJU IONIZIRAJUCEG ZRACENJA NA MAST COVJEKA II SAOPCENJE: O DJELOVANJU ZRAKA X I GAMMA NA MAST TEXTUS ADIPOSUS SUBCUTANEUS].
Eugen Cerkovnikov, Vera Gall-Palla, and Aleksa Steiner (Zagreb U., Med. Fac., Inst. of Chem. and Biochem. and Inst. of Physics, Rijeka, Yugoslavia).
Farmaceutski Glasnik, vol. 12, no. 2, Feb. 1966, p. 39-49. 12 refs. In Serbo-Croatian.

The action of X- and gamma rays was tested on subcutaneous adipose tissue of humans. A sex difference was noticed; iodine number and index of refraction were higher in kidney and subcutaneous fat of women, and melting point was lower than that of men. Changes were observed in irradiated fats, dependent on sex, age, dose, and quantity of energy received. Oxidizing changes occurred at doses of 18.5 X 10 krad. The most characteristic change was that of perioxide number which progressively increased with dose. In an advanced stage of oxidation, a slight decrease of iodine number was observed. The radiation had an outstanding effect on the color of human fat. The fat of women, especially kidney fat, reacted more strongly at a lower dose of radiation, while at higher doses the reaction was stronger in the subcutaneous and kidney fat of men. X-rays had a stronger effect on kidney fat, while gamma-rays had a stronger effect on subcutaneous fat.

A66-81291
BIOMEDICAL TELEMETRY.
Edited by Cesar A. Caceres (PHS, Heart Disease Control Program, Instr. Field Sta., Washington, D. C.)
New York, Academic Press, 1965, xvii+392 p. refs.
$15.00.

Biomedical telemetry, the transformation and transmission of physiological information, is discussed from the points of view of history, goals, needs, and descriptions of basic principles. The areas of telephone, radio, and space telemetry from humans and other animals are explored.

A66-81292
RADIOTELEMETRY: A CLINICAL PERSPECTIVE.
Cesar A. Caceres and James K. Cooper (PHS, Heart Disease Control Program, Instr. Field Sta., Washington, D. C.)
IN: BIOMEDICAL TELEMETRY.
New York, Academic Press, 1965, p. 85-105. 41 refs.

The historical development of medical short- and long-distance radiotelemetry is presented from the first uses of frequency modulation (FM) transmission to miniaturized wireless systems and new types of coding such as pulse width modulation (PWM). Transmissions of radio signals from heart, brain, and intestines are emphasized, but mention is made of the measurement of urine voiding pressure, the study of dental variables, and the use of "pacemakers" for diseased bladders and hearts.

A66-81293
RADIOTELEMETRY DURING CARDIAC EXERCISE TESTS.
Herbert J. Semler (St. Vincent Hosp., Div. of Cardiol., Dept. of Med., Cardiac Telemetry Sta., Portland, Ore.)
IN: BIOMEDICAL TELEMETRY.
New York, Academic Press, 1965, p. 129-145. 15 refs.

Radioelectrocardiograms were recorded in 576 healthy subjects between 15 and 77 years of age. Each subject was monitored continuously in the supine, sitting, and standing positions, and during and after a double Master's two-step test. Technically satisfactory electrocardiograms were recorded during exercise in 96% of the subjects. When the subjects changed from the supine to the sitting and standing positions, the mean ventricular rate increased more than 20%. During exercise, there was a further increase in heart rate to almost double the resting rate in the supine position. The majority of subjects were within 10% of the control rate within a period of three minutes after exercise. Several instances in which electrocardiograms recorded during exercise revealed coronary dysfunction are mentioned.

A66-81294
DATA REDUNDANCY REDUCTION FOR BIOMEDICAL TELEMETRY.
Lawrence W. Gardenhire (Radiation Inc., Advan. Commun. Group, Melbourne, Fla.)
IN: BIOMEDICAL TELEMETRY.
New York, Academic Press, 1965, p. 255-298.

As man has entered space, there has occurred a vast increase in the quantity of data about his physical well-being which must be reduced to usable proportions. Three methods for reducing the quantity of electrocardiographic data without damaging the interpretation were studied by using a digital computer. The step, two-point projection, and fan methods described are based on a point-to-point prediction of a continuous waveform. The advantages and disadvantages of each method are presented. For continuous-type data, the fan method worked best.

A66-81295
THE DEVELOPING CHALLENGE OF BIOSENSOR AND BIOINSTRUMENTATION RESEARCH.
Eugene B. Konecci and A. James Shiner (NASA Washington, D. C.)
IN: BIOMEDICAL TELEMETRY.
New York, Academic Press, 1965, p. 299-319. 16 refs.

Electrode implantation techniques and other miniaturized devices for assessing the influence of various stresses on humans are discussed. Trends

in electrocardiogram, electroencephalogram, impedance pneumography, and external blood pressure measuring transducer are outlined. Future prospects for using solid state electronics, solid state chemistry, and liquid-gel state electronics to study total body system responses are foreseen.

A66-81296
USES OF TELEMETRY IN SPACE.
Eugene B. Konecci and A. James Shiner (NASA Washington, D. C.)
IN: BIOMEDICAL TELEMETRY.
New York, Academic Press, 1965, p. 321–349. 8 refs.

A compilation is presented of past and proposed Soviet and American techniques, data return, and specific construction details for continuous biomedical monitoring of humans and other animals in the laboratory as well as during aeronautical and flight profiles. Circuitry and block diagrams are furnished for telemetry systems from physiological transducers through signal-modifying and analog-to-digital conversion apparatus for readout and recording.

A66-81297
EVALUATING TELEMETRY SYSTEMS.
Nelson T. Grisamore (George Washington U., School of Eng. and Appl. Sci., Washington, D. C.), James K. Cooper, and Cesar A. Caceres (PHS, Heart Disease Control Program, Instr. Field Sta., Washington, D. C.)
IN: BIOMEDICAL TELEMETRY.
New York, Academic Press, 1965, p. 351–376. 17 refs.

The six basic parts of any telemetry system (information source, transmitter, noise source, telemetry channel, receiver, and destination) must be considered as a whole whose goal is distortionless transmission of bits of information. The electronic characteristics which cause functional distortion are outlined, and specifications for frequency characteristics, time constant, phase characteristics, and linearity are discussed. Internal and external sources of noise should be minimized.

A66-81298
ADRENERGIC BETA-RECEPTORS AND NON-SHIVERING THERMOGENESIS.
E. Schönbaum, G. E. Johnson, E. A. Sellers, and M. J. Gill (Toronto U., Dept. of Pharmacol., Canada).
Nature, vol. 210, Apr. 1966, p. 426.

Cold-acclimatized rats were removed from the cold room, anesthetized with urethane (1-1.25 g./kg.) to alter the degree but not the type of the electrical response of muscle activity, and exposed to 4°C. to test non-shivering thermogenesis. After intraperitoneal injection of the β-adrenergic blocking agent, propranolol (0.3–0.9 mg./kg.), the animals showed a marked, dose-independent increase of electrical muscle activity. It was concluded, that propranolol block interfered with non-shivering thermogenesis, and that heat production increased due to electrical muscle activity. The site of non-shivering thermogenesis was not established in these experiments, but the results definetely indicated the importance of β-adrenergic receptors in the cold acclimatization mechanism.

A66-81299
INABILITY OF THE ELECTRORETINOGRAM TO RECOVER AFTER A BRIEF, HIGH-INTENSITY LIGHT STIMULUS.
Stanley Buckser (Carnegie Inst. of Technol., Dept. of Biol. Sci., Pittsburgh, Pa.)
Nature, vol 210, Apr. 23, 1966, p. 425–426.

Dark-adapted, curarized, and artificially respirated albino rats were exposed to light stimulation focused on the cornea. The alternating current amplification system with low and high frequency cut-offs at 0.06 and 1,000 c./s. was used. Electroretinograms (ERG's) were obtained in response to the entire energy flash given at intervals of 10 min. or more; the neutral density filters were replaced and ERG's were recorded again. The a-wave amplitude (E-a) was approximately constant at 195 and 245 μV when the 5.0 neutral density filters were used prior to the high-intensity flash, and 430 and 555 μV in response to the high-intensity stimulus. The E-a recovered to approximately 50 and 80 μV two hours after the flash and remained constant. The beta-wave amplitude failed to recover to the pre-high-intensity flash amplitude. In the second record the a-wave recovery did not occur even after 12 hrs. of dark adaptation. Repeated flash exposure showed an even lower degree of recovery. It is concluded that high-intensity flash stimulation lowers the amplitude of the ERG after hard adaptation.

A66-81300
COSMIC CONVERSATION: A BIOLOGIST'S VIEW.
H. Sandon
New Scientist, vol. 29, Mar. 31, 1966, p. 845–847.

The author presents his views on the subject of the existence in the universe of intelligent organisms biologically similar to terrestrial forms of life. The study of evolutionary processes on earth indicates a small probability of repetition of the same sequences of events outside the terrestrial environment. The idea of man's communication with other worlds inhabited by beings similar to man may be attractive, but it is hardly probable.

A66-81301
MILITARY CREATES NEW FOODS.
Frank K. Lawler.
Food Engineering, vol. 138, May 1966, p. 52–56, 68.

Stimulated by new utility food concepts for men in conditions ranging from jungles to space, advances in food technology, new processes, and new packages are being developed. The problems involved include: (1) preservation of food and its nutritional qualities by irradiation, dehydration, and freeze-dried processes; (2) packaging and coating to conserve storage space and a good seal; (3) development of moist food which requires no refrigeration; and (4) high caloric density. For spacemen, additional factors are necessary, such as: (a) bite-size protions, which produce no crumbs; (b) easy reconstitution by rehydration; (c) flexible containers to assure easy manipulation; and (d) precooked and prebaked foods to assure quick-serve meals. A list of foods and menus are described in detail.

A66-81302
OXYGEN TOXICITY IN HYPERBARISM.
Louis H. Nahum.
Connecticut Medicine, vol. 30, May 1966, p. 325–327. 8 refs.

The results of several investigations of the effects of hyperbaric oxygenation on lung tissue, ocular fundus, and nervous system of experimental animals are cited. Dogs kept under three atmospheres of pressure in 100% oxygen for four hours or longer and decompressed by standard Navy diving techniques showed characteristic ocular lesions, segmental degeneration of axons in the nerve fiber layer of the retina in the region encompassing and surrounding the optic nerve head. These lesions appeared to be identical to cytoid bodies, which are components of the "cotton-wool spots", characteristic of retinal vascular disease in man. In rabbit experiments, irreversible injury to visual cells, rather than the the vascular bed, was noted after five to six hours of exposure. There may be two mechanisms in oxygen toxicity: (1) increased vascular resistance induced by hypoxia, with a resultant ischemic retinal necrosis; and (2) a direct effect on the membrane and cellular enzymes.

A66-81303
DELAYED APPROACH OF ARTERIAL TO ALVEOLAR NITROUS OXIDE PARTIAL PRESSURES IN DOG AND IN MAN.
Edmond I. Egar, II, Arthur A. Babad, Michael J. Regan, C. Philip Larson, Richard Shargel, and John W. Severinghaus (Calif. U., Med. Center, Dept. of Anesthesia, San Francisco).
Anesthesiology, vol. 27, May-Jun. 1966, p. 288–297. 25 refs.
Grants PHS 5R01 HE-07946, 5-K3-GM-17, 5T1-GM-63, and HE-06285.

We have found an end-tidal to arterial nitrous oxide partial pressure difference in dogs and in man. The difference is about 15% of the end-tidal partial pressure at first, decreases to 10% by 1–2 minutes, and to 4% or less by 16 to 32 minutes. These results may be explained either by ventilation of perfused alveoli or by perfusion of unventilated alveoli (shunting), although neither explanation alone appears to account for the magnitude of the changes seen.

A66-81304
PROTEIN METABOLISM OF YOUNG MEN DURING UNIVERSITY EXAMINATIONS.
Nevin S. Scrimshaw, Jean-Pierre Habicht, Mary Lou Piché, Barbara Cholakos, and Guillermo Arroyave (Inst. de Nutr. de Centro Am., Div. of Physiol. Chem., Guatemala, C.A.)
American Journal of Clinical Nutrition, vol. 18, May 1966, p. 321–324. 13 refs.
Contracts DA 49-193-MD-2239 and Grant NIH AM 06274.

Twenty-six male M.I.T. undergraduates were studied before and during final examinations. They consumed constant amounts of a liquid formula diet, and complete urine collections were made. During the examination periods the pulse rate increased as did 17,21-dihydroxycorticosteroid excretion. In fifteen freshmen the average urinary creatinine, nitrogen, and sulfate excretion increased slightly during days of examinations; however, in upperclassmen, no changes in average excretions were detected. In both groups, however, there was a marked increase in day-to-day variation of nitrogen excretion during the examination period. The corresponding standard deviations during the examination period were from 45 to 90% higher than during the baseline period. For the group as a whole, seven would be classified as significant metabolic reactors to the stress induced by examinations, eight as mild reactors, and eleven as non-reactors. The maximum individual urinary nitrogen loss during days of examinations was 18% higher than during the baseline period, whereas the average loss was just over 4% higher. When precise estimation of individual nitrogen requirements is needed, the effect of stress in a particular individual requires consideration.

A66-81305
THE CONTENT OF CONSTANT DIETS: A COMPARISON BETWEEN ANALYZED AND CALCULATED VALUES.
Romauldo Manalo and John E. Jones (W. Va. U. Med. Center, Dept. of Med., Endocrinol. and Metab. Sec., Morgantown).
American Journal of Clinical Nutrition, vol. 18, May 1966, p. 339–342. 11 refs.
PHS Grants AM 05578 and NB 03152.

Thirty-five different constant diets were subjected to laboratory analysis and the values for sodium potassium, magnesium, calcium, phosphorous, and nitrogen were compared by statistical methods to values calculated from food composition tables. Laboratory analysis gave statistically significant higher values for sodium and phosphorus and lower values for magnesium and calcium than calculated values. No statistical differences were noted between analyzed and calculated values for nitrogen and potassium. Although accuracy in metabolic balance studies can only be achieved by laboratory analysis of dietary content, with the exception of phosphorus and magnesium, published tables offer a closer estimate of dietary values than heretofore reported.

A66-81306
LIPOGENESIS IN UNDERNUTRITION.
H. Ernst Wertheimer and Victoria Bentor (Hebrew U., Dept. of Biochem. and Hadassah Med. School, Jerusalem, Israel).
Israel Journal of Medical Sciences, vol. 1, May 1965, p. 361–364. 13 refs.

The conversion of acetate-1-C^{14} into neutral lipids of rat liver slices and epididymal adipose tissue was three to four times larger in undernourished rats than in ad lib. fed controls. Radioacetate conversion was greatly reduced in full starvation. The increase in lipogenesis was best demonstrable if carbohydrate content of the undernutrition diet was predominant. Substitution of starch with sucrose as the carbohydrate resulted in further increase in lipogenesis. The metabolic regulation during adaptation to undernutrition is discussed.

A66-81307
EXAMINATION OF WORKERS EXPOSED TO ELECTROMAGNETIC WAVES ONE METER AND LONGER IN THE WEST-BOHEMIA REGION [VYSETRENI PRACUJICICH V RIZIKU METROVYCH A DELSICH ELEKTROMAGNETICKYCH VLN V ZAPADOCESKEM KRAJI].
František Huzl, Eliška Klimková-Deutschova, Jarmila Jankova, Jiřina Mainerová, Zdeňka Salcmanová, Květa Schwartzová, Larisa Suchanová, and Jindřich Sýkora (Plzen, Oddelení chorob z povolání a toxikologie fakultní nemocnice and Neurologická klinika lékařské fakulty KU, Plzeň, Czechoslovakia).
Pracovní Lékařství, vol. 18, Apr. 1966, p. 100–108. 20 refs. In Czech.

Sixty-eight subjects were examined, working in the environment of an electromagnetic field of a frequency of 0.5 to 2.4 kHz and 3.5 to 30 MHz in workplaces with dielectric or high-frequency heating (uninterrupted field group I., 52 subjects) and in a workplace where the workers were exposed to the simultaneous action of an uninterrupted field and of an interrupted polyfrequency electromagnetic field (so-called pulse-operation- group II, 16 subjects). More significant changes were observed in 23% of the I. group and in 50% of the II. group. A serious form of disease was found only in one subject. Subjectively the workers claimed headache (44% in the I. group and 87% in the II. group), fatigue (33 and 63%), increased excitability (6 and 69%), increased need of sleep (10 and 44%), insomnia (10 and 19%). Objectively, vegetative symptoms (42 and 100%), deviations of the brain-nerves (25 and 50%), pyramidal symptoms (19 and 13%) were found. The EEG (electroencephalogram) showed a striking synchronization of the sharp waves, disturbance of the central line, and occurrence of sleep-activity. The whole state is evaluated as a disorder of the coordination of the cortex- and the mesodiencephalic CNS functions.

A66-81308
CHANGES IN BLOOD LEVELS OF LACTIC- AND PYRUVIC ACID DURING STATIC AND DYNAMIC LOAD [ZMENY V KRVNYCH HLADINACH KYSELINY MLIECNEJ A PYROHROZNOVEJ PRI STATICKOM A DYNAMICKOM ZATAZENI].
Václav Krampl, Imrich Borský, and Miloslav Hubač.
Pracovní Lékařství, vol. 18, Apr. 1966, p. 108–111. 10 refs. In Czech.

Changes in the levels of lactic and pyruvic acid were examined in 14 healthy men of age 20–24 immediately after five-minutes of muscle-load and during recovery: the oxygen consumption during the worktime was determined as a criterion for the evaluation of the static work component. Two static loads consisted of holding burdens of 7.5 or 30 kg. weight. Further, two loads, mostly of dynamic character were loading of burdens of 7.5 and 30 kg. weight from the floor to a 40 cm. high base at a rate of 12 lifts/min. Changes of the lactic acid level and the ratio lactate/pyruvate can in a certain extent serve as a criterion of the size of the static work component, but only in relation to the oxygen consumption during the work load. For example the lactic acid level after static loads reached values of 12–35 mg.% at an oxygen consumption of 0.1–0.6 l/min. After dynamic loads such values were first observed at consumptions of 0.4–1.3 l/min. Analogous changes were noted in the values of the ratio lactate/pyruvate, as in the pyruvic acid levels no significant differences was found between the static and dynamic work with regard to the extent of oxygen consumption. The level of lactic acid increased after static as well as after dynamic work according to the oxygen consumption, whereas the individual differences between the experimental subjects were considerable. The increase of pyruvic acid according to the oxygen consumption was not as significant.

A66-81309
ACUTE RESPIRATORY ACIDEMIA: CORRELATION OF JUGULAR BLOOD COMPOSITION AND ELECTROENCEPHALOGRAM DURING CO_2 NARCOSIS.
John S. Meyer (Wayne State U., Receiving Hosp., Depts. of Neurol., Detroit, Mich.), Fumio Gotoh (Harper Hosp., Wayne Center for Cerebrovascular Res., Detroit, Mich.), and Minoru Tomita (Keio U., Dept. of Internal Med., Tokyo, Japan).
Neurology, vol. 16, May 1966, p. 463–474. 48 refs
PHS and Receiving Hosp. Res. Corp. supported research.

Internal jugular blood gases and electrolytes were correlated with the electroencephalogram (EEG) during acute respiratory acidemia in 10 subjects. CO_2 inhalation produced a decrease in pH and increases in oxygen tension, oxygen saturation, carbon dioxide tension, sodium ionic activity, and potassium ionic activity of cerebral venous blood. Decreases in the pH of the internal jugular blood were closely related to the appearance of EEG slowing, while changes in carbon dioxide tension were not. EEG slowing regularly appeared whenever the pH of internal jugular blood fell below a threshold of 7.087 pH units, regardless of values for carbon dioxide tension. In subjects with occluson of the middle cerebral artery, EEG slowing appeared at lower levels of carbon dioxide tension in cerebral venous blood than in subjects without it, but the pH threshold remained the same in the two groups.

A66-81310
ACTIVITY OF THE RED NUCLEUS DURING DEEP DESYNCHRONIZED SLEEP IN UNRESTRAINED CATS.
M. M. Cassel, F. L. Marchiafava, and O. Pompeiano (Pisa U., Ist. di Fisiol., and Consiglio Nazl. delle Ric., Centro di Neurofisiol. e Gruppo d'Elettrofisiol., Pisa, Italy).
Archives Italiennes de Biologie, vol. 103, Sep. 10, 1965, p. 369–396. 49 refs.
Grant PHS NB 02990-03.

The background activity in the magnocellular part of the red nucleus and its modulation during sleep and wakefulness were recorded in unrestrained, unanesthetized cats with chronically implanted electrodes. During quiet wakefulness the discharge from the red nucleus reached a relatively steady value. During the stage of synchronized sleep there was a decrease in the rubral activity and peaks of discharge, synchronous with the spindle trains of electroencephalogram. During desynchronized sleep there was a phasic enhancement of the rubral discharge synchronous with bursts of rapid eye movement (REM). The phasic increase in rubral activity was not due to proprioceptive reverberation originating from either the extrinsic eye muscles during the bursts of REM or from the limb muscles during the myoclonic twitches. It persisted after ablation of the cerebellar and cerebral cortical projections to the red nucleus. The changes in the background activity of the red nucleus were paralleled by changes in rate of discharge recorded from single units during the different phases of sleep. Myoclonic twitches predominate during the REM periods of desynchronized sleep at the time of the phasic increments of rubral activity. These myoclonic twitches persisted after electrolytic destruction of the red nucleus, and of the red nucleus combined with ablation of the sensory-motor cortex. The response of the flexor muscles produced by repetitive stimulation of the red nucleus was strikingly depressed throughout the episodes of desynchronized sleep.

A66-81311
ELECTROPHYSIOLOGICAL STUDY OF THE DIFFERENT PHASES OF SLEEP IN THE RAT [ETUDE ELECTROPHYSIOLOGIQUE DES DIFFERENTES PHASES DE SOMMEIL CHEZ LE RAT].
A. Soulairac, Cl. Gottesmann, and M. J. Thangapregassam (Fac. des Sci., Lab. de Psychophysiol., Paris, France).
Archives Italiennes de Biologie, vol. 103, Sep. 10, 1965, 1965, p. 469–482. 39 refs.

Behavioral and electroencephalographic (EEG) phases of sleep were studied in rats by means of implanted electrodes. Deep sleep is characterized as a state distinct from classical sleep (slow EEG waves of high amplitude). During deep sleep there is a decrease of muscle tonus, variation in respiratory rhythm, myoclonus of ears and vibrissae, rapid eye movements, and EEG waves of high frequency and low amplitude.

A66-81312
THE ANAEMIA OF LEAD POISONING: A REVIEW.
H. A. Waldron (Vauxhall Motors Ltd., Med. Dept., Luton, Beds, Great Britain).
British Journal of Industrial Medicine, vol. 23, Apr. 1966, p. 83-100. 227 refs.

A historical resume of early clinical symptoms and pathological findings in lead poisoning anemia is followed by a discussion of the increased osmotic and mechanical fragility of circulating red cells and the fundamental inhibition of heme and prophyrin synthesis. In cases of human lead poisoning, the result of the Coombs' test is usually negative. Decreased erythrocyte survival times and morphological changes in erythroid cells of bone marrow are usually found. A summary of red cell survival times found in cases of lead poisoning is listed.

A66-81313
INCIDENCE OF HYPERTENSION AMONG LEAD WORKERS: A FOLLOW-UP STUDY BASED ON REGULAR CONTROL OVER 20 YEARS.
Kim Cramér and Lennart Dahlberg (Sahlgrenska Sjukhuset, Med. Serv. I, Gothenburg and AB Tudor, Nol, Sweden).
British Journal of Industrial Medicine, vol. 23, Apr. 1966, p. 101-104. 15 refs.

Three hundred and sixty-four workers employed in an accumulator factory had at least three blood-pressure determinations during 1962 in a study of the relation between lead exposure and the incidence of hypertension. In this group 46 workers were found to have hypertension; the expected incidence was 51. Two hundred and seventy-three of the total group, all over 35 years, had been employed for a sufficiently long time to be considered as having had a long-term exposure to lead. On the basis of urinary coproporphyrin tests, they were divided into a 'lead-affected' group (141) and a 'non-lead-affected' group (132). There were 22 persons with hypertension in the former group, and 20 in the latter. There was no significant difference in the appearance of hypertension in these two groups either from the standpoint of age or from the duration of exposure to lead. Two hundred and sixty-five workers had been employed at the factory for 10 or more years, and 82 of these for more than 20 years. There was a positive correlation between the incidence of hypertension and the duration of employment, but no difference between the 'lead-affected' and 'non-lead affected' groups. This observation is understandable in view of the increasing incidence of hypertension with advancing age. The study shows that workers in an accumulator factory, in which the working conditions are inspected and controlled regularly and in which the workers themselves are examined regularly for the influence of lead, are not more prone to hypertension than the general population. In view of the possibility of vascular damage after exposure to lead, blood pressures in lead-workers should be watched, and treatment started early if hypertension is found.

A66-81314
BLOOD LEAD AND HAEMOGLOBIN IN LEAD ABSORPTION.
M. K. Williams (London School of Hyg. and Trop. Med., Dept. of Occupational Health and Appl. Physiol., Great Britain).
British Journal of Industrial Medicine, vol. 23, Apr. 1966, p. 105-111.

In an analysis of blood lead and hemoglobin estimations from 655 lead workers, there was no indication of any change in the hemoglobin until the blood lead exceeded 110 μg./100 ml.; the slight fall at higher levels of blood lead was not significant at the 5% level of confidence. Sixty-seven men who had blood leads greater than 90 μg./100 ml. were examined clinically. One had a low hemoglobin but none had symptoms or signs that were likely to be due to lead absorption. A further 18 men had hemoglobins of 89% (13 g./100 ml.) or less. None was thought to be low due to lead absorption. The absence of symptoms, signs, and low hemoglobins in association with relatively high blood leads is unlikely to be due to errors in blood lead or hemoglobin estimation. Alternative possibilities are that there were no susceptible workers among those studied; or that the stable conditions of exposure in this population allowed the development of relatively high blood leads without other evidence of high lead absorption. When the hemoglobin is abnormal, blood lead observations may be more meaningful in a correction factor, approximately equal to 100/Hb%, is used. It is concluded that in a population where sophisticated lead control is practiced no purpose is served by estimating hemoglobins in all lead workers every three months, but only in those whose blood lead is likely to be in excess of 110 μg./100 ml. It may also be of value in the first year of exposure to detect susceptible workers.

A66-81315
URINARY COPROPORPHYRIN ISOMERS I AND III IN LEAD WORKERS AND A CONTROL GROUP.
Shawkia Mehani (Ain Shams U., Fac. of Med., Dept. of Forensic Med., Abbassia, Cairo, Egypt).
British Journal of Industrial Medicine, vol. 23, Apr. 1966, p. 112-115. 17 refs.

The excretory pattern of coproporphyrin I and III isomers was studied in urine from nine healthy subjects and ten lead-exposed workers with no clinical evidence of lead poisoning. In normal urine, the content of coproporphyrin I exceeded coproporphyrin III; but coproporphyrin III predominated in lead workers, although this was accompanied by an increase in the absolute amount of coproporphyrin I, indicating active hemopoiesis in lead absorption.

A66-81316
THE EFFECT OF LOWERED ENVIRONMENTAL TEMPERATURE ON LIPID METABOLISM IN RATS FED ON NORMAL AND HIGH-FAT, HIGH-CHOLESTEROL DIETS.
P. Bobek and E. Ginter (Inst. of Human Nutr. Res., Lab. Dept., Bratislava, Czechoslovakia).
British Journal of Nutrition, vol. 20, no. 1, 1966, p. 61-68. 36 refs.

Prolonged intermittent exposure to reduced environmental temperature (+2°) produced in rats given a nutritionally well-balanced diet a decrease in the concentration of esterified fatty acids in the blood serum, liver, and epididymal fat tissue. In the last there was a significant increase in the unesterified: esterified fatty acid ratio. The hepatic synthesis of fatty acids from [1-14C] acetate remained unchanged. A decrease in the concentration of cholesterol was found in the blood serum, liver, and lungs of animals exposed to cold. When a high-fat, high-cholesterol diet was given, exposure to cold increased the mobilization of lipids; this was indicated by the elevation of the unesterified fatty acid levels in the blood serum and in the epididymal fat tissue. In rats given the high-fat diet the lipotropic action of cold on the liver was confirmed. This action was characterized by a decrease of esterified fatty acid levels and by an increase of glycogen concentration in the liver. This effect is probably due to a lowering of hepatic lipogenesis and to increased oxidation of fatty acids in the liver tissue. In rats given the high-fat diet, cold exposure produced an increased cholesterol accumulation in the tissues and more pronounced morphological changes in the myocardium.

A66-81317
THE EFFECTS OF DARKNESS AND OF OCCLUSION OF THE PUPILS ON CONTROL OF EYE MOVEMENTS [INFLUENCE DE L'OBSCURITE ET DE L'OCCLUSION DES PAUPIERES SUR LE CONTROLE DES MOUVEMENTS OCULAIRES].
M. Jeannerod, P. Gerin, and J. Mouret (Hop. neurol., Lab. d'E.E.G., Lyon, France).
Année Psychologique, vol. 45, no. 2, 1965, p. 309-324. 43 refs. In French.

Eye movement characteristics were recorded in visually deprived, normal individuals (condition of total darkness). The subjects had to reproduce, in darkness or with eyelids closed, some fixed or moving pattern recently observed. While the eye movements during observation were strictly adapted to the elements of the visual field, the eye movements during the reproduction were enhanced, more so with lids closed than with eyes open in darkness. The possible mechanisms of this phenomenon were studied in consideration of the conditions for eye-movement control.

A66-81318
EFFECTS OF SPEED OF MOVEMENT AND OF TRAVERSED SPACE ON TIME ESTIMATION [INFLUENCE DE LA VITESSE DU MOUVEMENT ET DE L'ESPACE PARCOURU SUR L'ESTIMATION DU TEMPS].
Claude Bonnet (Sorbonne, Lab. de Psychol. Exper. et Comparee, Paris, France).
Annee Psychologique, vol. 45, no. 2, 1965, p. 357-363. In French.

The influence of space and speed on variation of perceived time was measured in six groups of eight subjects. In the first, experiment, when speed was varied, no systematic effect was found. In the second experiment, amount of time perceived was decreased as speed and space were increased.

A66-81319
CURRENT DATA ON SELECTION AND TRAINING FOR NOCTURNAL VISION.
Bousyad.
(Office Intern. de Doc. de Méd. Mil., 26th Session, Alger, Nov. 1964).
Revue Internationale des services de sante des armées de terre de mer et de l'air, vol. 29, Feb. 1966, p. 117-121. In French.

Between nocturnal (scotopic) and diurnal (photopic) vision, an intermediary, or mesopic, type of vision exists. A list of characteristics found by experiments with reduced illumination is proposed for the selection and training of personnel for night missions, such as reconnaissance, and combat. The potential for successful night vision is composed of two factors: a sensory elementary factor, and a psychosensory factor which corresponds to the intellectual qualities which permit him to use to maximum advantage his sensory capacity and to succeed in seeing without being seen. The sensory elementary factor includes good visual acuity, normal chromatic vision, and a clear delineation of the extent of mesopic and scotopic vision.

A66-81320
THE RELATION OF AUTONOMIC ACTIVITY TO AGE DIFFERENCES IN VIGILANCE.
Walter W. Surwillo (Natl. Inst. of Child Health and Human Develop., Bethesda, Md.)
Journal of Gerontology, vol. 21, Apr. 1966, p. 257-260. 10 refs.

To test the hypothesis that differences in autonomic activity are associated with age differences in the rate at which vigilance deteriorates, heart rate, palmar skin temperature, and palmar skin potential were studied in a group of 33 young (Mn= 36.4 years) and 33 old (Mn= 74.3 years) males. Subjects continuously monitored the discrete movements of a pointer for a period of one hour and pressed a response key whenever the pointer displayed a specific, irregular type of movement. In the final 45 minutes of the task, heart rate declined and skin potential increased progressively. The slopes of the regression lines that described these changes, however, did not differ significantly with age. Skin temperature, on the other hand, declined progressively with time in the young group but not in the old group, and the slopes in this case differed significantly. The latter result was consistent with the hypothesis that differences in autonomic activity are associated with the more rapid decline of vigilance in old than in young subjects.

A66-81321
LONGEVITY IN NEUTRON-EXPOSED GUINEA PIGS.
Donald J. Kimeldorf, Richard D. Phillips, and Dave C. Jones (U.S. Naval Radiol. Defense Lab., Div. of Biol. and Med. Sci; San Francisco, Calif.)
Journal of Gerontology, vol. 21, Apr. 1966, p. 265–267. 7 refs.

A colony of male guinea pigs was maintained in a duration-of-life study to determine the effects of fast neutron exposure on life span of this species. The median life span for the non-irradiated population was 828 days, with a few animals living to nearly four years of age. A single, total-body exposure of young adults to fast neutrons reduced the median life span by 16% after a dose in the range of 120 to 160 rads and by 12% after 100 rads.

A66-81322
LEARNING AND PERFORMANCES AS A FUNCTION OF THE PERCENTAGE OF PURSUIT COMPONENT IN A TRACKING DISPLAY.
George E. Briggs (Ohio State U., Columbus) and Mary R. Rockway (Air Force Systems Command, Systems Eng. Group, Res. and Training Div, Wright-Patterson AFB, Ohio).
Journal of Experimental Psychology, vol. 71, Feb. 1966, p. 165–169.
Contract AF 33(616)-6107.

Subjects were trained on either a 0%, 25%, 50%, 75%, or 100% pursuit display and then transferred to either a 0%, or a 100% pursuit display in a simple positioning tracking task. During training there was significant improvement in performance for each increment in percentage of pursuit component; during transfer there were no differences among groups within each transfer condition. It is concluded that percentage of pursuit has primarily a performance, not a learning effect.

A66-81323
ABSOLUTE THRESHOLD FOR VISUAL SLANT: THE EFFECT OF STIMULUS SIZE AND RETINAL PERSPECTIVE.
Robert B. Freeman, Jr. (Pennsylvania State U., Univ. Park)
Journal of Experimental Psychology, vol. 71, Feb. 1966, p. 170–176. 11 refs.
Grant PHS MH 08856.

Slant thresholds were obtained for 14 sizes of textureless rectangles. Threshold slant decreased as a monotonic, decelerating function of size. Threshold retinal perspective increased as a power function (with an exponent of about 1.6) of visual angle subtense of the slanted rectangle at threshold slant.

A66-81324
FACILITATION OF PERFORMANCE THROUGH THE USE OF THE TIMING SYSTEM.
Stuart J. Dimond (Trinity Coll., Dublin).
Journal of Experimental Psychology, vol. 71, Feb. 1966, p. 181–183. 7 refs.

Two tasks were performed continuously and simultaneously. The temporal distribution of signals on one task was varied, so that the signals were either regular or irregular. The subjects after some delay came eventually to appreciate the signal regularity, and reaction time performance improved. At the same time, this improvement on one task was reflected in considerable improvement on another task performed simultaneously, which could not be explained solely in terms of decreased response latency.

A66-81325
COGNITIVE FACTORS IN IMPAIRMENT: A NEUROPSYCHOLOGICAL STUDY OF DIVIDED SET.
Robert B. Malmo (McGill U., Allan Mem. Inst., Montreal, Canada).
Journal of Experimental Psychology, vol. 71, Feb. 1966, p. 184–189.
14 refs.
Defence Res. Board, Natl. Res. Council of Canada, and PHS supported research.

Forty-two subjects, tracking manually but expecting to shift from single (manual) to double (manual and pedal) tracking later in the trial, did not track as well as they did with unified set, expecting to continue with manual tracking all through the trial. This poorer tracking under the condition of divided set was not accompanied, however, by any reliable physiological changes (quantified electroencephalogram in 3 frequency bands, action potentials from 5 muscles, heart rate, respiration, and palmar conductance). That this absence of differences in the physiological measures was not due to their insensitivity was demonstrated in a control comparison in which highly significant physiological differences were obtained under conditions in which the performance difference very closely approximated that found in the comparison between divided and unified set. It was concluded that the performance decrement under the condition of divided set was unrelated to change in physiological activation.

A66-81326
EFFECT OF A COMPOSITE INSTRUCTIONAL SET ON RESPONSES TO COMPLEX SOUNDS.
Stanley J. Rule and John W. Little (Boeing Co., Renton, Wash.)
Journal of Experimental Psychology, vol. 71, Feb. 1966, p. 202–202.

Seventy-two subjects rated sounds under noisiness, annoyance, or composite instructions. Composite instructions were instructions in which both noisiness and annoyance were used as terms. Four factors of sound were investigated: (a) overall intensity, (b) fundamental tone frequency, (c) fundamental tone intensity, and (d) overtone intensity. An analysis of the interactions between instructional set and stimulus variables supported the previous findings (Rule, 1964) that instructions set subjects to give different emphasis to stimulus factors. The data further indicated that the emphasis given to different stimulus factors under the composite instructional set was a compromise between the emphasis given under noisiness and annoyance sets presented independently.

A66-81327
MUSCULAR EFFORT AND ELECTRODERMAL RESPONSES.
Lawrence A. Pugh (Central State Griffin Mem. Hosp., Norman, Okla.), Carl R. Oldroyd (Okla. U., Norman), Thomas S. Ray, and Mervin L. Clark.
Journal of Experimental Psychology, vol. 71, Feb. 1966, p. 241–248. 15 refs.
Grants NIH MY-4260

In order to study the relative effects of preparatory sets and muscular effort on electrodermal responses, 12 subjects lifted 3 different weights at 2 rates of lift over several trials. Periods of preparation, tactual stimulation, and muscular effort were separated in order to distinguish between the effects of each. No relation was found between weight and galvanic skin response (GSR) under lift conditions although GSR was related to weight as a tactual stimulus. GSR was proportional to rate of lift during preparatory periods as well as during lift. GSRs and conductance levels appear to be a function more of set than of muscular effort.

A66-81328
VISUAL FIELD POSITION AND WORK-RECOGNITION THRESHOLD.
Willis Overton and Morton Wiener (Clark U., Worcester, Mass.)
Journal of Experimental Psychology, vol. 71, Feb. 1966, p. 249–253. 13 refs.
Grant PHS M-3860.

Right vs. left visual field recognition-threshold behavior was investigated by use of monocular rather than binocular viewing condition for English words at 2 distances from fixation. While right visual-field locations were better recognized than left, the findings suggest this to be attributable to the effects in the left hemiretina of the left eye and more specifically to the effect of the most distant stimulus position. Several explanations including a "selective neural training" and trace-scanning "post-exposure process" are discussed. None of the present explanations appear to account satisfactorily for all of the data in the present study.

A66-81329
ABSOLUTE JUDGMENTS OF DURATION.
Lawrence E. Murphy (Ariz. U., Tucson).
Journal of Experimental Psychology, vol. 71, Feb. 1966, p. 260–263.
8 refs.

An informational analysis was used to determine the maximum number of durations that subjects can identify. Twenty subjects made absolute judgments of 3 to 9 auditory durations. The results indicate that, for durations in the range of 0.5 to 5.0 sec., accurate judgments were made for each of 6 to 7 durations; on the other hand, with intervals selected from a 0.1 to 1.0 sec. range, only 4 to 5 durations could be identified accurately. Knowledge of past results was found to aid in judgments in the 0.5 to 5.0 sec. range. The number of stimulus durations, knowledge of results, and range of durations were each found to have a significant effect on information transmission.

A66-81330
DIMENSIONALITY IN HUMAN INFORMATION STORAGE.
Melvin H. Rudov (Aerospace Med. Res. Lab., Wright-Patterson AFB, Ohio).
Journal of Experimental Psychology, vol. 71, Feb. 1966, p. 273–281. 6 refs.

An investigation was carried out to determine if error factors resulted from performance of an information processing task involving visual memory. It was found that reading 1 line from memory of a rectangular matrix of letters, after a short delay following their tachistoscopic exposure, did result in positional errors perpendicular to parallel to, and diagonal to the direction of scan when subject was reading leftwards or rightwards across a row or upwards or downwards in a column. Evidences for error factors of form and sound were also found. Further investigations showed that the error pattern changed when the matrices were distorted by offsetting alternate rows or columns of the matrix. The results were interpreted as evidence of information being stored in independent dimensions.

A66-81331
TIME AND EVENT UNCERTAINTY IN UNISENSORY REACTION TIME.
Donald Reynolds (Michigan State U., East Lansing).
Journal of Experimental Psychology, vol. 71, Feb. 1966, p. 286–293. 18 refs.
Natl. Inst. for Mental Health supported research.

Prior bisensory studies in reaction time (RT) have not obtained a pure speed measure of response latency. Errors in tracking tasks and differential latencies to bisensory stimuli are confounded with pure response latency; such results cannot adequately explain the psychological refractory period (PRP). Using pairs of visual stimuli, event uncertainty was held at 0 while temporal uncertainty was manipulated. Results show: (a) a general rise in mean 1st RT as a function of interstimulus interval length; (b) the PRP seems inversely related to "practice" of subjects; (c) some evidence for extinction of competing responses accounting for the shapes of the RT curves. A competing response theory was offered to explain PRP, thought a special case of the "Temporary Inhibition of Response" phenomenon (Reynolds, 1964).

A66-81332
SHORT-TERM MEMORY FOR MOTOR RESPONSES.
Jack A. Adams (Ill. U., Urbana) and Sanne Dijkstra (Free U. Amsterdam, The Netherlands).
Journal of Experimental Psychology, vol. 71, Feb. 1966, p. 314–318. 13 refs.
Grant AF-AFOSR-135-63

Two experiments were conducted on short-term memory for simple linear, graded motor responses, with length of retention interval and number of practice repetitions or reinforcements as 1, 3, and 6 in Experiment I and 1, 6, and 15 in Experiment II. Absolute error was the primary performance measure. Both experiments found error to be an increasing function of retention interval. Number of reinforcements was a significant variable only for the wider range of values in Experiment II, with error being a decreasing function of the variable. Results were considered parallel to those of corresponding studies on short-term memory for verbal responses. Interpretation was in terms of a rapidly decaying memory trace that becomes increasingly stable with reinforcement.

A66-81333
VENTRICULAR CONDUCTION AND REFRACTORINESS DURING HYPOTHERMIA.
Joseph C. Torres (Boston U. School of Med., Dept. of Physiol., Mass.)
Circulation Research, vol. 18, Mar. 1966, p. 323–329. 19 refs.
Grants Natl. Heart Inst. He-04355 and 1-K3-HE-7063.

The effect of hypothermia on ventricular conduction was determined with a multiterminal electrode sutured to the epicardial surface. Measurements of conduction intervals revealed average increases of 95% at 22°C. in 13 dogs, and 148% at 20°C. in seven dogs which survived to this temperature. The mean conduction velocity estimated at 0.55 m./sec. at 37°C. diminished to 0.29 m./sec. and 0.19 m./sec., respectively, at 22° and 20°C. An apparent overall exponential relationship between conduction velocity and temperature was observed, although below 30°C. the rate of conduction decreased almost linearly with Q_{10} of 1.6 to 1.8. Individual measurements along both rows of intersecting electrode terminals revealed slightly different rates of conduction. However, with the entire group the direction of relatively faster conduction was inconsistent and, furthermore, the changes of conduction velocity with hypothermia were practically identical for the two recording alignments in all instances. During cooling to 22°C. the absolute and the relative phases of ventricular refractoriness both increased by more than 200% of the control values observed at 37°C. This threefold effect on recovery of excitability was in contrast to the twofold slowing of conduction at the same temperature. It is concluded that the occurrence of ventricular fibrillation during hypothermia cannot be explained adequately by assuming a greater slowing of conduction relative to prolongation of refractoriness.

A66-81334
HISTOLOGICAL EVIDENCE FOR LOCALIZED RADIAL FLOW OF ENDOLYMPH.
Merle Lawrence (Mich. U. Med. School, Kresge Hearing Res. Inst., Dept. of Otorhinolaryngol., Ann Arbor).
Archives of Otolaryngology, vol. 83, May 1966, p. 406–412.
Grant Natl. Inst. of Neurol. Diseases and Blindness NB-03410.

Guinea pigs were allowed to recover for periods of one, three, six, and ten weeks following sterile surgical rupture of Reissner's membrane. All animals allowed to recover for periods over one week showed localized degeneration of the hair cells of the organ of Corti. Depending upon the extent of the lesion this degeneration in some animals spread toward the apex but never toward the base. In animals examined six weeks or more after the operation there is localized nerve and spiral ganglion degeneration in addition to the hair cell degeneration. The fact that the smaller the lesion the more restricted the extent of degeneration indicates a rather specific pattern of endolymph flow, otherwise the chemical contaminant causing the degeneration should be carried in the direction of the flow: toward the base in the case of longitudinal directions of flow. It is not clear, however, from this study whether the local chemical contaminant is caused by a break in Reissner's membrane or interference with the terminal blood supply.

A66-81335
ANTERIOR CEREBELLAR AND LABYRINTHINE ARTERIES: A STUDY IN THE CAT.
Joel M. Bernstein and Herbert Silverstein (Harvard Med. School, Mass. Eye and Ear Infirmary, Dept. of Otolaryngol., Boston).
(Am. Acad. of Ophthalmol. and Otolaryngol., 9th Ann. Meeting, Chicago, Nov. 13, 1965).
Archives of Otolaryngology, vol. 83, May 1966, p. 422–435. 19 refs.

A study of the neurovascular relations of the anterior cerebellar artery and the labyrinthine arteries was undertaken in the cat. The anterior branch of the anterior cerebellar artery is always related to the internal auditory meatus. In no case did the labyrinthine artery arise from the basilar artery directly. In the cerebellopontine angle and in the internal auditory meatus the anterior cerebellar artery lies anterior to the cochlear nerve and posterior to the facial nerves and between the cochlear and vestibular nerves. Five consistent branches to the labyrinth and their neural relations are described. Obstruction of the anterior cerebellar artery and its branches was performed in 21 cats. Three animals had a sensory lesion in the apical turn. Apical lesions of the cochlea following vacular obstruction in guinea pigs, cats, dogs, and humans are discussed. It is concluded that obstruction of the anterior cerebellar artery or labyrinthine artery system may produce greater changes in the apical region of the cochlea.

A66-81336
CLINICAL IMPLICATIONS OF LOUDNESS BALANCING.
F. Blair Simmons and Richard F. Dixon (Stanford U. School of Med., Div. of Otolaryngol., Palo Alto, Calif.)
Archives of Otolaryngology, vol. 83, May 1966, p. 449–454. 13 refs.

Loudness defects detected by the Alternate Binaural Loudness Balance (ABLB) method depend only partially upon the type of cochlear tissue damage. Recruitment, as the term is commonly used, is a built-in feature of nearly—if not all—low-frequency sensorineural hearing losses regardless of cause, because of peculiarities in sound energy distribution within the ear. Two other types of threshold audiograms (abrupt high-frequency losses of cochlear origin, and normal-threshold brainstem defects) are used to demonstrate other manifestations of this energy distribution which regularly produce loudness decreases during ABLB tests.

A66-81337
HISTOCHEMICAL STUDIES ON THE EPITHELIAL STRUCTURES OF THE INNER EAR.
J. Malecki, Z. Ukleja, K. Lipowska-Pawlak (Postgraduate Med. Center, Dept. II of Otolaryngol., Warsaw, Poland).
Polish Medical Journal, vol. 4, no. 1, 1965, p. 203–208. 10 refs.

Histochemical investigations of the otolithic membranes, the cupula, and the tectorial membrane of the inner ear were performed by the Schiff method, the Hale method, and by means of metachromatic staining using toluidine blue, on a material containing 15 temporal bones of 8 human fetuses, 24 temporal bones of pigeons, and 15 temporal bones of mice. These studies showed that all the mentioned epithelial structures of the inner ear stain uniformly, which may be considered a proof of their common origin and similar functions. It may be supposed that the uniformity of histochemical reactions is present with only slight deviations throughout the whole development cycle and the life of the individual, because no essential differences between the preparations from human fetuses in early stages of development and the preparations obtained from adult pigeons and mice could be noticed. Our observations confirm the investigations of Wislocki and Ladman (1952) and reveal the presence of sulfur bound to mucopolysaccharides, probably as disulfides.

A66-81338
ACTIVATION OF THE HIPPOCAMPUS BY REPEATED ANOXIC HYPOXIA [ACTIVATION DE L'HIPPOCAMPE PAR DES HYPOXIES OXYPRIVES REPETEES]
P. Passouant and C. Pternitis (Fac. de Med., Lab. de Pathol. Expti., Montpellier, France)
Acta Physiologica Academiae scientiarum hungaricae, vol. 26, no. 1–2 1965, p. 123–130. 6 refs. In French.

Repeated anoxic hypoxia in unrestrained cats induced activation of the hippocampus. During repeated acute hypoxia (4% oxygen), isolated peaks and a few fast spindles were observed. Repeated subacute hypoxia (8% oxygen), resuscitation, and post-anoxic period were manifested by an organized discharge of variable expression: rhythmic peaks, spindles, and tonico-clonic discharges.

A66-81339
EFFECTS OF TOBACCO SMOKING ON LEVEL OF PERFORMANCE DURING A VIGILANCE TASK: RELEVANCE OF HEART RATE AS A COMPLEMENTARY ELEMENT OF INTERPRETATION [INFLUENCE DE LA FUMEE DE TABAC SUR L'EVOLUTION DE LA PERFORMANCE AU COURS D'UNE TACHE DE SURVEILLANCE: INTERET DE LA FREQUENCE CARDIAQUE COMME ELEMENT COMPLEMENTAIRE D'INTERPRETATION].
C. Tarrière, F. Hartemann, and M. Niarfeix.
Travail Humain, vol. 29, Jan.–Jun. 1966, p. 1–21. 14 refs. In French.

The effect of carbohemia of smokers during a vigilance task was studied. In all 24 smokers, the level of detection performance was higher during smoking (notwithstanding carbohemia of 1.5 ml. carbon monoxide per 100 g. of blood) than when deprived of tobacco since the previous evening. Superior efficiency was also observed in comparison with that of a test group of 42 non-smokers; the performance of the latter decreased during the 150 min. of the task, but that of the smokers showed no significant decrease. Heart frequency increased correspondingly to the progression of the performance curves. The respective parts played by the nicotine and a possible personality factor common to the majority of smokers are discussed to show the facilitating effect of tobacco on performance. The importance of smoking in carbon monoxide intoxication is also discussed as a factor increasing environmental air pollution.

A66-81340
MEASUREMENT OF PHYSIOLOGICAL INDICES RESULTING FROM THE WEAR OF SPECIAL GARMENTS [MESURE DE LA CHARGE PHYSIOLOGIQUE RESULTANT DU PORT DE VETEMENTS SPECIAUX].
Jean Negro (Centre d'Etude du Bouchet, Vert-le-Petit (S.-et-O.), France).
Travail Humain, vol. 29, Jan.–Jun. 1966, p. 31–41. 10 refs. In French.

Variations of the physiological indices, Craig's index (IC) and cardiac cost of recovery (CCR), were contrasted while subjects worked on a bicycle ergometer at 90 watts and 120 watts during 15 minutes. Subjects were dressed either in a cotton suit or protective clothing (waterproof overall, and/or mask with or without canister). The waterproof protective clothing was a stress to the subjects, but the suppression of the respiratory load improved significantly the comfort of the waterproof clothing assembly.

A66-81341
STUDY OF THE ELECTROENCEPHALOGRAM DURING CONTINUOUS STATIC MUSCULAR WORK IN MAN [ETUDE DE L'ELECTROENCEPHALOGRAMME AU COURS DU TRAVAIL MUSCULAIRE STATIQUE CONTINU CHEZ L'HOMME].
M. Pottier (Conservatoire Natl. des Arts et Metiers, Lab. of Physiol. du Travail; and Centre Natl. de la Rech. Sci. Paris, France).
Travail Humain, vol. 29, Jan.–Jun. 1966, p. 43–56. 25 refs. In French.

Electroencephalogram (EEG) and cortical evoked potentials produced by simple or flickering light flashes were recorded in ten subjects during a test of continuous static muscular work of the right biceps and synergistic muscles. There was a marked decrease in the alpha wave index of the EEG during work. The minimal frequency of EEG visual pacing by flickering light flashes decreased during muscular work. The EEG pacing was produced at lower frequencies for most of the subjects during static work. Evoked response to simple light stimulation was only slightly modified during the test, but there was an increase in V wave. Changes in EEG observed during muscular work might be due to the proprioceptive afferences which activate the reticular formation.

A66-81342
POST HYPOXIC SYNDROMES: STUDIES ON THE POST-HYPOXIC SYNDROMES.
Haruo Ikegami (Air Self Defence Force, Aero-Med. Lab., Tokyo, Japan).
Japanese Journal of Aerospace Medicine and Psychology, vol. 3, Dec. 1965, p. 1–12. 17 refs. In Japanese.

Eleven healthy males were exposed to a simulated altitude of 8,000 m. with oxygen masks. In the first chamber flight, electroencephalograms (EEG) were recorded for 15 min., during which time the subjects were induced to fall hypoxic for 5 min. by switching their oxygen supply to ambient air and then to recover by switching back to pure oxygen inhalation. In the second chamber flight, the same subjects were assigned the performance tests (simple calculation tests) through the 5 min. of hypoxia and the post-hypoxic reoxygenation. EEG's showed marked slowing during the hypoxic periods, and then turned to arousal pattern shortly after reoxygenation. It was revealed by the frequency analysis that all components except very fast ones were built up during hypoxia. The increase was especially marked in alpha (8–13 c.p.s.) and theta components (4–7 c.p.s.), followed by delta-1 component (2–3.5 c.p.s.). Ten to 20 sec. after reoxygenation the energy level of each component returned to the control level with a negative phase in alpha, theta, and beta-1 component (14–20 c.p.s.). The negative phase continued for 5 sec. to 3 min., averaging 67 sec. The performance tests showed abrupt decrease of their mental performance just after the reoxygenation in three subjects, and quick recovery within 30 sec. The subjects had several symptoms, such as dizziness, lightheadedness, numbness, and syncope. Seven subjects had specific phosphenes which appeared in the dark visual field with eyes closed during their post-hypoxic periods, while one had it during the hypoxic period.

A66-81343
WIND SHIELD: INFLUENCE OF THE SCRATCH ON THE WIND SHIELD UPON THE VISUAL FUNCTIONS TO THE MOVING OBJECT.
Akihiro Suzumura (Nagoya U., Res. Inst. of Environmental Med., Japan).
Japanese Journal of Aerospace Medicine and Psychology, vol. 3, Dec. 1965, p. 13–20. 11 refs. In Japanese.

The influence of a scratched wind shield on the visual function of pilots was measured. Depth perception and visual acuity of moving objects were measured under several conditions. Measurement of fatigue was also carried out by determining the accommodation of the eye as one of the indicators. Although the scratch on the wind shield did not affect the visibility to the static visual object, it markedly lowered the visibility to the moving object. Fatigue was induced when the moving object was seen through the scratched wind shield.

A66-81344
AVERAGE NORMAL VALUES FOR THE FORCED EXPIRATORY VOLUME IN WHITE CAUCASIAN MALES.
J. E. Cotes, C. E. Rossiter, I. T. T. Higgins, and J. C. Gilson (Med. Res. Council, Pneumoconiosis Res. Unit, Llandough Hosp., Penarth, Glamorgan, Great Britain).
British Medical Journal, vol. 1, Apr. 23, 1966, p. 1016–1019. 23 refs.

A linear regression of forced expiratory volume ($F.E.V._1$) on age and height is reported for 275 healthy male subjects living in the United Kingdom. The regression coefficients are similar to those reported from other countries in N. W. Europe and N. America. The equations have therefore been combined to yield the following overall relationship, which may be of use for predicting average normal values: $F.E.V._1 = 3.62$ Ht (m.) $- 0.031$ age (years) $- 1.41$ (S.D. > 0.5) 1 B.T.P.S. (body temperature and pressure saturated with water vapor). The limitations to the use of this relationship are discussed.

A66-81345
DECREASED RADIATION MORTALITY IN DOGS TREATED WITH TYPHOID–PARATYPHOID VACCINE.
E. J. Ainsworth and F. A. Mitchell (U.S. Naval Radiol. Defense Lab., San Francisco, Calif.)
Nature, vol. 210, Apr. 1966, p. 321–323. 14 refs.

Intravenous injections of typhoid–paratyphoid vaccine (TAB) 24 hours. before mid-lethal exposure to radiation (360 rads) significantly increased percentage survival in dogs, but did not significantly increase survival when given one hr. after irradiation. The mechanism of the endotoxin protective power is not known. It may produce cellular population shift in bone marrow compartments which results in an increased surviving fraction of precursor cells. Endotoxin treatment after irradiation effected a diminished rate of fall in granulocytes during the second post-irradiation week, which may indicate an increased production and/or release of granulocytes into the circulation. The protective effect of TAB may be due to hematopoietic recovery and the transitory increase in number of granulocytes and platelets which may combat infection and disease during critical post-irradiation phase.

A66-81346
INFLUENCE OF AMINOETHYLISOTHIOURONIUM BROMIDE-HYDROBROMIDE AND HYPOXIA ON RECOVERY FROM RADIATION INJURY IN MICE.
E. J. Ainsworth, T. L. Phillips, and K. Kendall (U.S. Naval Radiol. Defense Lab., San Francisco, Calif.)
Nature, vol. 210, Apr. 16, 1966 p 323–324. 11 refs.

Experiments were conducted in mice protected by AET (amino-ethyli-sothiouronium bromide-hydrobromide) or hypoxia before exposure to radiation, in order to determine the degree of recovery and to indicate the gradual

return to normal radiosensitivity following a sub-lethal dose by the split-dose technique. In non-protected mice, recovery proceeded rapidly during the first few days. Mice protected by AET or hypoxia showed a different pattern of recovery, although the initial injury was theoretically equivalent to non-protected controls. The protected mice showed initial (24 hrs.) delay in recovery. Then recovery proceeded rapidly in the hypoxic group, comparable to controls, but in the AET group the recovery occurred only after a week. Mice protected by AET or hypoxia showed a greater sensitivity to a second exposure than would be expected from the protection ratio determined from the acute lethality studies.

A66-81347
DELTA-AMINO-LEVULINIC ACID AS EARLY SIGN OF LEAD EXPOSURE.
Dusan Djuric, Ljiljana Novak, Svetislav Milic, and Danica Kalic-Filipovic (Inst. of Occupational Health, Belgrad, Yugoslavia).
Medicina del Lavoro, vol. 57, Mar. 1966, p. 161–166. 19 refs.
Contract PHS BSS-OH-YUG-1.

A medical examination was made of 108 workers exposed to various concentrations of lead. Hematologic analyses were performed and lead in blood and urine, aminolevulinic acid (ALA), copro-, and uroporphyrins were determined. It was established that increase of ALA in the urine is the first sign of lead exposure. As the exposure increases, the copro- and sometimes the uroporphyrins are increased, so that the whole biosynthesis of porphyrins is disturbed. No strict correlation between ALA and coproporphyrin was found. It would be of interest to establish whether the increase of ALA is specific for lead exposure and poisoning, because coproporphyrinuria is a common sign of poisoning with other heavy metals.

A66-81348
PORPHYRIN METABOLISM IN CHRONIC LEAD POISONING AND IN ANEMIAS AND LIVER DISEASES NOT CAUSED BY LEAD POISONING [IL RICAMBIO PORFIRINICO DEL SATURNISMO CRONICO E IN ANEMIE ED EPATOPATE NON SATURNINE].
G. Saita, L. Moreo, and G. Croce (Milano U., Clin. del Lavoro "L. Devto"; and N.A.I.L. Centro di Studi e Ric. sulle Malattie Profess., Rome, Italy).
(2° Simp. Intern. sul Metab. norm. e patol. delle Porfirine, Saint-Vincent, Jun. 1965)
Medicina del Lavoro, vol. 57, Mar. 1966, p. 167–174. 19 refs. In Italian.

The behavior of serum and urine delta-aminolevulinic acid (ALA), of porphobilinogen (PBG), of urinary uroporphyrin (UP), and coproporphyrin (CP), and of blood protoporphyrin (PP IX) was studied in subjects with several liver and blood diseases with the aim of defining the value of these tests in the differential diagnosis of lead poisoning. In liver diseases the blood protoporphyrin is normal or only slightly increased; the values of blood protoporphyrin, which are markedly increased in chronic lead poisoning, are therefore sufficient to evaluate the effect of lead in subjects with symptoms of liver impairment. On the contrary, in many cases of anemia, the values of blood protoporphyrin are high and therefore not useful for differential diagnosis. A marked increase of ALA with normal PBG is characteristic of chronic lead poisoning. On the contrary, in non-saturnine anemias and liver diseases the increase of ALA, when present, is almost always accompanied by a significant increase of PBG.

A66-81349
SURVIVAL OF BACTERIA ON METAL SURFACES.
T. R. Wilkinson (Calif. U., School of Publ. Health, U.S. Naval Med. Res. Unit No. 1 and Naval Biol. Lab., Berkeley).
Applied Microbiology, vol. 14, May 1966, p. 303–307. 18 refs.
Office of Naval Res. supported research.

Survivor curves were determined for Serratia marescens, Sarcina lutea, Pasteurella tularensis, and P. pestis deposited from the airborne stage onto metallic surfaces and subsequently stored at various humidities and temperatures. Cells of all species tested remained alive longest in a dry atmosphere, except cells of S. marescens, which survived best in a saturated atmosphere. Survival decreased most rapidly at the intermediate humidity level for three of the test organisms, yet P. tularensis died most rapidly in a saturated atmosphere. An increase in temperature decreased survival of P. pestis and P. tularensis.

A66-81350
TRANSFORMATION OF USEFUL INFORMATION IN MAN [ZA PRERABOTVANETO NA POLEZNATA INFORMATSIIA OT CHOVEKA].
A. Gidikov (Bulgarian Acad. of Sci., Inst. of Physiol., Sofia).
Eksperimentalna Meditsina i Morfologiia, vol. 4, no. 1, 1965 p. 5–10. In Bulgarian.

In the reactions of choice the author studied the dependence of the reaction time on the input information during constant changes of the combinations between the single signals and the reactions, with which they might respond to their appearance. Two types of reactions were observed: (a) with equal mean reaction time to every kind of equally probable signals, and (b) with different mean reaction time in spite of the equal probabilities of the signals. A series of conditions, on which the type of reaction depended, was determined. In the second type of reaction the mean reaction time depended on the amount of the useful information during firm choice and the use of Z-algorithm.

A66-81351
PROPRIOCEPTIVE REGULATION OF RESPIRATION AND BLOOD CIRCULATION DURING MUSCULAR WORK [PROPRIORETSEPTIVNA REGULATSIIA NA DISHANETO K KRUVOOBRASHTENIETO PRI MUSKULNA RABOTA].
D. Mateev and E. Kiselkova (Georgi Dimitrov Higher Inst. of Phys. Culture, Dept. of Physiol., Sofia, Bulgaria).
Eksperimentalna Meditsina i Morfologiia, vol. 4, no. 1, 1965, p. 15–20. 6 refs. In Bulgarian.

Muscular work sets in motion a number of vegetative changes. Particularly in trained persons, these changes are closely differentiated according to the needs of the muscular metabolism. The physiological mechanism of these changes is still not entirely explained. Up to now the dominant opinion that the centrifugal motor impulse sets in motion both the working muscles and the vegetative centers in the hypothalamus neglects the role of muscular afferentation which is no doubt considerable in the regulation of the activity of the internal organs during muscular work. In our investigations we undertook the task of loading functionally only the muscular afferent system and observing its reflections on the vegetative functions. We achieved this after we had induced a lengthening of the human biceps brachi muscle. In this way a stimulation of the muscular proprioceptors was achieved without the presence of motor cortical impulses from the pyramidal tract. The stimulation of the proprioceptors induced both more frequent pulse rate and respiration, and the frequency was relative to the strength of the stimulation. These studies reveal that the afferent impulses in muscular work have a direct effect on the vegetative centers in the hypothalamus and that they can provoke directly in this way the known vegetative changes during muscular activity.

A66-81352
END POINT OF LATERALIZATION FOR DICHOTIC CLICKS.
Harvey Babkoff and Samuel Sutton (N.Y. State Dept. of Mental Hyg., Biometrics Res., New York).
Journal of the Acoustical Society of America, vol. 39, Jan. 1966, p. 87–102. 27 refs.
Dept. of HEW supported research.

A series of experiments was undertaken to systematically study one aspect of binaural interaction for dichotically presented clicks, the end point of lateralization, which is referred to as lag-click threshold. The results of experiments in which click parameters were manipulated indicate that the lag-click threshold is decreased by an increase in the sensation level (SL) of both clicks, by an interaural intensity asymmetry favoring the lag click, or by a decrease in the low-frequency components of both clicks. The results of experiments in which the background-noise parameters were manipulated indicate that as the SL of binaural broad-band noise (125–8000 c.p.s.) is increased to 30 db., the lag-click threshold decreases; but as the noise level is increased further, the lag-click threshold increases. A one-octave low-frequency band of noise presented either to both ears or to the ear receiving the lead click, decreases the lead-click threshold, while a one-octave high-frequency band of noise presented either to both ears or to the ear receiving the lead click increases the lag-click threshold.

A66-81353
REMOTE MASKING IN THE ABSENCE OF INTRA-AURAL MUSCLES.
Robert C. Bilger (Eye and Ear Hosp., Bioacoust. Lab. and Pittsburgh U., School of Med., Pa.)
Journal of the Acoustical Society of America, vol. 39, Jan. 1966, p. 103–108. 10 refs.

To ascertain the role of the stapedial reflex in remote masking, remote and contralateral remote masking were studied on separate groups of listeners who had had their stapedius muscles excised surgically. Separate groups of listeners who had audiometrically and otoscopically normal ears were used to obtain control data. The results of the studies show that neither remote nor contralateral remote masking depends upon the stapedial reflex, but both vary with the degree of hearing loss. In remote masking, an orderly relation exists between the amount of remote masking and the sensation level (SL) of the masker at hearing levels of 1000 and 1500 c.p.s. This information, with exaggerated remote masking in cases of sensorineural loss, supports the earlier explanations of remote masking solely in terms of cochlear mechanics. For contralateral remote masking, the relationship between masking and hearing loss is not as orderly as that for remote masking. The absence of a systematic relationship between SL of the masker and onset or amount of centralateral remote masking suggests that it is a central rather than a peripheral phenomenon.

A66-81354
ACOUSTIC RELATIONS OF THE HUMAN VERTEX POTENTIAL.
Hallowell Davis and Stanley Zerlin (Central Inst. for the Deaf, St. Louis, Mo.)
Journal of the Acoustical Society of America, vol. 39, Jan. 1966, p. 109–116 29 refs.
PHS supported research.

The average amplitude of the slow, diffuse, nonspecific electrical response of the human cortex, called the V (vertex) potential, evoked by tone pips or by tactile stimuli to thumb and forefinger, follows a power law with exponent of about 0.24 (sound pressure). The variability of the responses is great. If auditory or tactile stimuli are judged equally strong, across frequency or modality, the V potentials tend to be equal. Both the latency and the amplitude of the V potential are independent of the rise time of a tone burst, at least up to 100 msec. The amplitude also remains nearly constant as the duration of the plateau of a burst, with rise and fall times of 5 msec., is varied from 2 to 320 msec. An off response which closely resembles the on response in waveform, latency, and amplitude appears at the end of any burst which is long enough, but an off response which follows an on response by one sec. or less is much reduced in amplitude, and so is an on response which too closely follows an off response. The V potential is a response to change in stimulation either on or off.

A66-81355
AUDITORY THRESHOLD LOCATION AND UNCERTAINTY AS A FUNCTION OF TONE PARAMETERS AND FATIGUE.
Herman R. Silbiger and D. N. Elliott (Wayne State U., Auditory Res. Lab., Detroit, Mich.)
Journal of the Acoustical Society of America, vol. 39, Jan. 1966 p. 117–124. 13 refs.
PHS supported research.

The relationship of auditory threshold location for various pulsed and continuous tones was investigated, using a Békésy audiometer. For periods of 250 to 750 msec., an increase in repetition rate resulted in a decrease in threshold, independent of the duty cycle. This relationship was maintained after a TTS_{6-10} (temporary threshold shift) of 20 db. The pen-excursion size (PES), however, was a function of the pulse length, during TTS_{6-10}, with the longer pulse giving the greatest reduction in PES. Continuous tones yielded the highest thresholds and the greatest reduction in PES under normal conditions and under TTS_{6-10}. It therefore appears that threshold location and PES may be independently manipulated. The differences in threshold location are thought to be due to an increase in the ability to make tone present–absent decisions during interruptions, while the decreases in PES during TTS_{6-10} may be due to the perception of the increased rate of loudness intensity.

A66-81356
MASKING OF SPEECH BY AIRCRAFT NOISE.
K. D. Kryter and Carl E. Williams (Bolt Beranek and Newman Inc., Cambridge, Mass.)
Journal of the Acoustical Society of America, vol. 39, Jan. 1966, p. 138–150. 14 refs.
FAA supported research.

Word intelligibility tests at various intensity levels were administered to a crew of trained listeners in the presence of recorded noise from jet and propeller-driven aircraft. The noise was that which would be present outdoors and in a house as the result of engine runup operations and if aircraft were flying overhead shortly after takeoff and prior to landing. According to visual inspection of the data, methods of measuring or evaluating aircraft noise predict the results of the speech tests in the following order of merit, from best to worst: (1) articulation index (AI), (2) perceived noise level in decibels (PNdB), (3) speech interference level (SIL), (4) noise criteria (NC), (5) over-all sound pressure level on A scale (SPL A scale), and (6) over-all SPL on C scale. The difference among PNdB, SIL, NC, and SPL A scale are probably not significant according to these tests.

A66-81357
STIMULUS VERSUS RESPONSE DECISIONS AS DETERMINANTS OF THE RELATIVE FREQUENCY EFFECT IN DISJUNCTIVE REACTION-TIME PERFORMANCE.
P. John Dillon (McGill U., Montreal, Canada).
Journal of Experimental Psychology, vol. 71, Mar. 1966, p. 321–330. 12 refs.
Grant Defence Res. Board, Canada 9425-10.

In a typical disjunctive reaction-time (DRT) task, one cannot separate the relative contributions of stimulus and response events to decisions underlying performance. In the present study, use of a conditional DRT technique permitted independent variation of stimulus and response frequencies. The effects of these variations on response latency and galvanic skin response (GSR) were studied in 4 experiments, on a total of 96 subjects. An inverse relation between RT (and GSR) and frequency of the response alternatives, but not of the corresponding stimulus alternatives, was demonstrated. It is suggested that models of DRT performance should stress response-selection rather than stimulus-identification factors in decision processing.

A66-81358
SERIAL LEARNING AS A FUNCTION OF MEANINGFULNESS AND MODE OF PRESENTATION WITH AUDIO AND VISUAL STIMULI OF EQUIVALENT DURATION.
Rudolph W. Schulz and Richard A. Kasschau (Iowa U., Iowa City).
Journal of Experimental Psychology, vol. 71, Mar. 1966, p. 350–354. 10 refs.
Dept. of HEW supported research.

To shed further light on the role of the "input modality" in the verbal-learning process, 126 subjects, 21 per condition, learned 12-item serial lists of disyllables which represented three levels of meaningfulness (m) and were presented to the subject either aurally or visually. An important difference between this study and previous ones is that the duration of stimulation under aural and visual conditions was equated with a high degree of precision. It was found that m and mode interacted reliably in that performance with low m material was better under visual than under aural conditions of presentation while this trend was observed to be reversed with high m material. Serial position and the sex of the subjects did not interact with either m or mode of presentation.

A66-81359
PERCEIVED DURATION AS A FUNCTION OF AUDITORY STIMULUS FREQUENCY.
Austin Jones and Marilyn MacLean (Pittsburgh U., Pa.)
Journal of Experimental Psychology, vol. 71, Mar. 1966, p 358–364. 7 refs.
Grant Natl. Inst. of Mental Health M-2479.

Subjects made absolute magnitude estimations of durations ranging from 8 to 250 sec. Auditory clicks were broadcast during each trial at frequencies ranging from 0 to 10 clicks/sec. Magnitude estimations were found to be an increasing function of click frequency from 0 to 1.50 per sec., thereafter declining slightly. The magnitude of this "frequency effect" was found to be a decreasing monotonic function of duration. For durations of 8 sec., the mean magnitude estimation was displaced upward 13% by an increase in frequency from .25 to 1.50 per sec. The comparable alterations of 13- and 24-sec. estimations were 12% and 4%, respectively. Although the subjects' mean absolute error of estimation for single trials was 45%, mean errors computed algebraically over either 2 or 6 trials were only ± 6–9%. Estimations were an almost perfect linear function of duration, the pooled slopes for three experiments being 1.000, .974, and 1.056, with an overall mean of 1.01.

A66-81360
RESOLVING OF SUCCESSIVE CLICKS BY THE EARS AND SKIN.
George A. Gescheider (Va. U., Charlottesville).
Journal of Experimental Psychology, vol. 71, Mar. 1966, p. 378–381. 10 refs.
Grant Natl. Inst. of Neurol. Diseases and Blindness NB04177.

When two successive clicks are presented to the ears either a single sound image or two successive sound images is perceived, depending on the temporal difference between the two stimuli. In agreement with previous findings, the time difference necessary for binaurally resolving two equally loud clicks was 1.8 msec. The comparable monaural threshold was 1.6 msec. When the fingertips were stimulated the pulses had to be separated by 10–12.5 msec., depending on the locus of stimulation. In both auditory and cutaneous stimulation manipulation of the intensity relationship between the first and delayed stimulus produced large changes in thresholds. As the delayed stimulus was attenuated from 0 to 15 db. the threshold rapidly increased, but when the first stimulus was attenuated from 0–20 db. the threshold decreased slightly at 5–10 db. and then began to increase gradually.

A66-81361
PHONEMIC SIMILARITY AND INTERFERENCE IN SHORT-TERM MEMORY FOR SINGLE LETTERS.
Wayne A. Wickelgren (Mass. Inst. of Tech., Cambridge).
Journal of Experimental Psychology, vol. 71, Mar. 1966, p. 396–404. 16 refs.
NASA Grant NsG 496 and Grant Natl. Inst. of Mental Health MH 08890-01.

One hundred and seventy two subjects copied a list of proactive interference (PI) letters, then copied a single letter to be recalled later, then copied a list of retroactive interference (RI) letters, and then attempted recall of the single letter. The length (0, 4, 8, or 16 letters) and phonemic similarity (0, 25, 50, 75, or 100% similar letters) of the PI and RI lists were varied systematically. Both PI and RI were demonstrated in short-term memory (STM) for single letters ($p < .001$). RI continued to increase with increasing length of RI list; PI did not increase appreciably beyond four letters. Both PI and RI increased with increasing phonemic similarity of the PI and RI lists for low

and medium degrees of similarity of the other interference list, RI or FI list, respectively ($p < .001$). The findings suggest a 2-factor theory of forgetting in STM, involving retrieval interference and decay or storage interference.

A66-81362
COMPENSATORY HUE SHIFT IN SIMULTANEOUS COLOR CONTRAST AS A FUNCTION OF SEPARATION BETWEEN INDUCING AND TEST FIELDS.
Tadasu Oyama (Chiba U., Yahagicho Chiba City, Japan) and Yun Hsia (Columbia U., New York, N. Y.)
(Japan. Psychol. Assn., 28th Conv., Oct. 5–9, 1964).
Journal of Experimental Psychology, vol. 71, Mar. 1966, p. 405–413. 20 refs.
Contract Nonr 266(46) and Columbia U. supported research.

Each of two color-normal subjects was instructed to adjust a monochromator illuminating a foveally fixated 4° circular test field to give a "best" blue, green, and yellow in ascending and descending determinations; a red setting was obtained only in an ascending sequence, i.e., in order of increasing wavelength. Settings were made in the presence and absence of a 30° circular surround (inducing field) of each of the same four colors. A compensatory shift in wavelength setting for the contrast-induced tinge occurred almost always in the direction of the inducing color; this trend was observed under varying conditions of separation between the inducing and test fields, ranging from 0° to 8°. Over this entire range of separation, another trend was observed that the amount of shift decreased as the separation increased.

A66-81363
MAGNITUDE OF GRAVITOINERTIAL FORCE, AN INDEPENDENT VARIABLE IN EGOCENTRIC VISUAL LOCALIZATION OF THE HORIZONTAL.
Earl F. Miller, II and Ashton Graybiel (U.S. Naval Aviation Med. Center, Res. Dept., Pensacola, Fla.).
Journal of Experimental Psychology, vol. 71, Mar. 1966, p. 452–460. 26 refs.
NASA supported research.

The direction of gravitoinertial force (GIF), i.e., the resultant of the gravitational and induced centripetal force vectors, was held constant while the magnitude of force was varied from 1.0 to 2.0 g to determine its effect upon egocentric visual localization (EVL) of the horizontal. Eight normal and two labyrinthine-defective (L-D) men served as subjects. The EVL of the horizontal was found to deviate from the gravitoinertial horizontal as a function of magnitude of the GIF. This magnitude effect tended to increase with the amount of body tilt from its alignment with the resultant force. The increase of GIF in the case of the L-D subjects resulted generally in an apparent rotation of the physical horizontal in a direction of the E then A phenomenon in contrast to the normal subjects who manifested ever increasing amounts of the E phenomenon only. Based upon these findings and the assumption that subjects differed under the experimental conditions primarily in otolithic function, the possible roles of otolithic and non-otolithic gravireceptor cues in visual localization in the absence of empirical visual cues are discussed.

A66-81364
MEMORY SPAN AS A FUNCTION OF VARIABLE PRESENTATION SPEEDS AND STIMULUS DURATIONS.
M. C. Corballis (McGill U., Montreal, Canada).
Journal of Experimental Psychology, vol. 71, Mar. 1966, p. 461–465. 12 refs.
Grant Defence Res. Board, Canada 9425-10.

Digit-span series were presented on three films, one to each of three groups of twenty subjects. In Film 1, presentation speed was varied between series. In Film 2, it was varied within series as well. In Film 3, it was varied between series only, but degree of variability between series was more extreme than in Films 1 or 2. Stimulus duration was varied in all three films. When stimulus durations were long, number correct was higher the slower the presentation speed, but when stimulus durations were short, there was a tendency for this trend to be reversed in Films 1 and 2, though not in Film 3. Implications of these findings are discussed.

A66-81365
LATENCY AND MAGNITUDE FOR GSR AS A FUNCTION OF INTERSTIMULUS INTERVAL.
Arno F. Wittig and Delos D. Wickens (Ohio State U., Columbus).
Journal of Experimental Psychology, vol. 71, Mar. 1966, p. 466–467. 5 refs.
Grant NSF G 6203.

The relationship between latency and magnitude of galvanic skin response (GSR) was studied as a function of interstimulus interval (ISI). The correlations between the two measures varied between −.68 and −.85 on the extinction trials. Significant differences among groups as a function of ISI were found only for the latency measure, but both measures showed maximal conditioning in the 450–1250 msec. range.

A66-81366
MECHANISM AND MEASUREMENT OF THE GALVANIC SKIN RESPONSE.
J. D. Montagu (U. Coll., Dept. of Pharmacol., and Runwell Hosp., London, Great Britain) and E. M. Coles (Brit. Columbia U., Dept. of Psychiat., Vancouver, Canada).
Psychological Bulletin, vol. 65, May 1966, p. 261–279. 82 refs.
Grant Natl. Inst. of Mental Health MY-3561.

The measurement of the galvanic skin response (GSR) is subject to error from many sources. Recent work has elucidated the peripheral mechanism of the response and has provided an appropriate electrical model. This review considers the measurement and analysis of the GSR in the light of this recent work. Dc and ac methods are compared. The relative merits of constant current (resistance) and constant voltage (conductance) measurements are discussed; and the optimal electrode systems are defined. A brief survey of the organismic and environmental variables which influence the response is included.

A66-81367
MORPHOLOGICAL CHANGES IN THE ORGAN OF HEARING OF LABORATORY ANIMALS UNDER THE EFFECT OF HIGH-PARAMETER VIBRATION AND OF NOISE [MORFHOLOGICHESKIE IZMENENIIA V ORGANE SLUKHA U PODOPYTNYKH ZHIVOTNYKH PRI VOZDEISTVII VIBRATSII VYSOKIKH PARAMETROV I SHUMA].
E. F. Enin (Med. Inst., Ear, Nose and Throat Clin., Stavropol, USSR).
Vestnik Otorino-Laringologii, vol. 27, Jan.–Feb. 1965, p. 25–29. 8 refs.
In Russian.

Vibration with frequency of 50/sec. and an amplitude of 0.9 mm. in conjunction with medium-frequency noise of up to 100 db. intensity provokes in albino mice and rats degenerative-atrophic alterations, first in ganglionic cells of the upper helix and then in the organ of Corti and in the spiral ganglion of the underlying helices. All this is parallelled by changes in the tympanic cavity muscles and exudative manifestations in the middle ear. Such a noise alone results in less marked changes, commencing in the organ of Corti of the lower helix and gradually extending to upper helices.

A66-81368
VARIATIONS IN THE SLOPE COEFFICIENT OF THE LINEAR RELATIONSHIP BETWEEN THE ELECTROMYOGRAM AND THE FORCE OF CONTRACTION DURING MUSCULAR EFFORT AND FATIGUE [VARIATIONS DU COEFFICIENT DE PENTE DE LA RELATION LINEAIRE ENTRE L'ELECTROMYOGRAMME GLOBAL ET LA FORCE DE LA CONTRACTION, AU COURS DE L'EFFORT ET DE LA FATIGUE DE MUSCLE].
C. Solomon, C. Teodorescu, and C. Bălteanu.
(Filiale de Jassy de l'Acad. de la Rep. Socialiste de Roumanie, Commun., Mar. 17, 1965).
Revue Roumaine de Physiologie, vol. 1, no. 4, 1965, p. 403–414. 37 refs.

Variations in angular slope coefficient, characteristic of the proportionality between the electromyogram and the force of contraction during intense muscular effort prolonged to fatigue, were studied in 58 trained and untrained subjects. In untrained subjects, the coefficient increased progressively during muscular effort, and was more marked in the subjects who succeeded in maintaining a constant force of contraction. In trained athletes, the variation curve of the slope coefficient increased markedly during the second (critical) phase, but later stabilized at a maximal value. In subjects trained to physical labor, the curve was either lowered or showed a tendency to remain constant during the muscular effort.

A66-81369
REACTION TIME AS A MEASURE OF PERCEPTUAL VIGILANCE.
Leslie Buck (U. Coll., Ind. Psychol. Res. Unit, London, Great Britain).
Psychological Bulletin, vol. 65, May 1966, p. 291–304. 69 refs.

This article reviews the use made of reaction time as an index of performance deterioration in monitoring tasks, with special reference to the hypothesis that reaction time and detection rate are correlated indices of perceptual vigilance. It is concluded that this is the case, and a theoretical model relating the two indices to changes in vigilance occurring with time on task is proposed.

A66-81370
THE RELATIONSHIP BETWEEN VIGILANCE AND MONOTONOUS WORK.
Robert A. Baker and J. Roger Ware (HumRRO Div. No. 2 (Amor), Fort Knox, Ky.)
Ergonomics, vol. 9, Mar. 1966, p. 109–114. 9 refs.

Forty subjects worked for two hours each at four different routine and monotonous tasks: (1) a simple vigilance task, (2) a bean-sorting task, (3) a simple assembly task, and (4) a two-digit addition task. Subject's performance was scored in terms of signals detected or number of errors made. The coefficients of concordance (Kendall's W) were statistically significant. Intercorrelations among the four tasks, however, showed that subject's

vigilance performance contributed to the overall agreement among the measures. It was concluded that subject's performance on the sorting task, for example, was predictable from their performance on assembling and adding. Vigilance performance, however, was not predictable from behavior on the other tasks. The vigilance task, therefore, appears to contain elements not found in other montonous work. It is suggested that two of these unique aspects are the lack of automaticity and the inability of the subject to control or pace his work rate.

A66-81371
INDUSTIRAL SHIFT WORK: DECREASE IN WELL-BEING AND SPECIFIC EFFECTS.
J. M. Dirken (Netherlands Inst. for Prevent. Med., Leyden).
Ergonomics, vol. 9, Mar. 1966, p. 115–124. 5 refs.

By means of a standardized and validated inventory approximately 600 shift workers and 1200 non-shift workers were investigated. The inventory consisted of dichotomous questions concerning essentially vague complaints of somatic and psychosomatic nature. The conclusions of this investigation were as follows. To a certain degree a stereotyped pattern of complaints exists. This pattern is the same in shift workers and in non-shift workers, in several types of industry and probably also in several districts. To a slight degree the pattern is typical for a factory. The data does not indicate that complaints about nervousness and gastro-intestinal disorders occur more frequently in shift workers than in non-shift workers. It was found, however, that there was a significant decrease in general well-being. This difference is smaller after the elimination of influences originating from environmental load and aging, but the slight influence of shift work, though non specific, remains.

A66-81372
AN INVESTIGATION INTO THE COMPARATIVE SUITABILITY OF FOREARM, HAND AND THUMB CONTROLS IN AQUISITION [SIC] TASKS.
M. Hammerton and A. H. Tickner (Med. Res. Council, Appl. Psychol. Res. Unit, Cambridge, Great Britain).
Ergonomics, vol. 9, Mar. 1966, p. 125–130.

Performance of subjects on a set of two-dimensional velocity control acquisition tasks was measured when the control was operated by thumb, hand, and forearm. Four control conditions—high and low sensitivity with 0 and 2 sec. exponential lag—were used. Six groups, each of six naval ratings, acted as subjects; and the three limb-segments were compared under all conditions. It was found that, under the easiest condition, there was no significant difference between the controls; but in the most difficult, hand was superior to both forearm ($p < 0.001$) and thumb ($p < 0.01$), while thumb was superior to forearm ($p < 0.01$).

A66-81373
PRINCIPAL COMPONENT ANALYSIS OF THE RESPONSES TO STANDARD EXERCISE TRAINING.
R. J. Shephard and S. Callaway (Min. of Defence Chem. Defence Exptl. Estab., Porton Down, Wilts, Great Britain).
Ergonomics, vol. 9, Mar. 1966, p. 141–154. 6 refs.

Common elements governing the responses to a standard program of exercise training were investigated by the statistical technique of principal component analysis. Convergence of the data was checked by a pilot trial on a desk calculator and three definitive computer analyses were then carried out. The first and second computer analyses were based on a wide range of measurements of pulse rate, respiratory minute volume, and personality. Six components accounted for 70% of the variance of the data. These were tentatively identified as (1) cardiac response to exercise, (2) resting state, (3) ventilatory changes with training, (4) and (5) influence of personality on resting state and exercise response, and (6) body size. Components (1) and (5) were related to the subjects' initial physical fitness. For the third computer analysis several measurements shown to be redundant were excluded and specific metabolic measurements were included. Six components then described 77% of the variance. The initial metabolic cost of exercise was represented in components (1) and (2) and changes with training in component (4). Fitness was correlated most closely with the initial oxygen cost of exercise, and was also more closely related to pulse than to ventilatory measurements, and to results on Day 1 than to changes during training. Selection and weighting of parameters to yield an optimum objective assessment of physical fitness are discussed.

A66-81374
THE SOLAR RADIATION AREA OF MAN.
C. R. Underwood and E. J. Ward (Med. Res. Council Labs., Natl. Inst. for Med. Res., Div. of Human Physiol., Hampstead, London, Great Britain).
Ergonomics, vol. 9, Mar. 1966, p. 155–168. 8 refs.

The amount of solar energy incident upon the body surface can be calculated if the intensity of the beam and the area of the body projected sunwards are known. A photographic method is described which was developed for the measurement of the areas of the body in the standing posture which are projected in a direction normal to the solar rays. Twenty-five male and 25 female subjects were studied, whose surface areas ranged from 1.30 $m.^2$ to 2.20 $m.^2$. The effective radiating areas are related to the surface area of the body and this relationship is substantially independent of body size and shape. An equation was found which enables the radiating area to be computed for any angle of altitude and orientation of the body with respect to the direction of the sun.

A66-81375
THE INCORPORATION OF PHOSPHORUS INTO ERYTHROCYTES UNDER DIFFERENT STRESS CONDITIONS.
Ianos Szántay and Petre Derevenco (Dept. of Nucl. Med., Cluj, Rumania).
Revue Roumaine de Biochimie, vol. 2, no. 4, 1965, p. 349–365. 19 refs.

Following ^{32}P labelling, the modifications of phosphoric compound metabolism were studied in erythrocytes of rats subjected to simple stress (swimming or administration of atropine and hexamethionium chloride, respectively), or to a severe stress (swimming+ atropine and swimming+ hexamethoinium chloride, respectively), as compared to rats in which stress was prevented by pantopon administration or compared to control rats (injected with saline solution). The groups subjected to a simple stress showed an increase in erythrocyte ^{32}P total value along with the increase in both free phosphates and ADP (adenosine diphosphate). The groups subjected to a severe stress lost erythrocyte ^{32}P which passed into the plasma. They also displayed radiochromatographic alterations indicating disorders of erythrocyte energy metabolism.

A66-81376
EVOLUTION OF THE CELL FROM PRIMORDIAL LIVING SYSTEMS.
Earl D. Hanson (Wesleyan U., Shanklin Lab., Middletown, Conn.)
Quarterly Review of Biology, vol. 41, Mar. 1966, p. 1–12. 40 refs.

A hypothesis for the emergence of a cell system from primitive, noncellular, living systems is proposed. The first living system is assumed to have been a reflexively catalytic system which showed the biological properties of self-formation in at least some of its variants. Natural selection would have acted on such a system and further development might be viewed in terms of selection pressures which would tend to extend the period of survival of the individual systems and shorten the period needed for self-formation. It is argued that functions and structures anticipatory of present cell systems would be selected under such conditions. Special attention is given to the emergence of the genetic apparatus; it is concluded that it emerged not as the primitive and simplest form of an organism but as a considerably later development, after establishment of a metabolically complex system. Natural selection is viewed as an ordering principle in biopoietic studies.

A66-81377
TECHNIQUE FOR RADIO TELEMETRY OF BLOOD-FLOW VELOCITY FROM UNRESTRAINED ANIMALS.
Dean E. Franklin (Scripps Clin. Res. Found. and Scripps Inst. of Oceanog., La Jolla, Calif.), Nolan W. Watson, Robert L. Van Citters (Wash. U., Dept. of Physiol. and Biophys., Seattle), and Karl E. Pierson.
American Journal of Medical Electronics, vol. 5, First Quarter 1966, p. 24–28. 5 refs.
Grants PHS HE-08337, HE-08433, and GM-10521.

This report describes the circuitry and operation of a miniature telemetry blood flowmeter based on the Doppler principle. A plastic cylinder containing lead–zirconate sound-emitting and sensing crystals is clamped about a blood vessel to serve as the transducer. Five-megacycle sound is beamed from one crystal diagonally through the vessel wall into the blood stream. Part of the sound is backscattered from the blood and excites the second crystal. This signal is amplified and detected. The difference between transmitted and received frequencies, i.e., the Doppler shift of backscattered sound, is a measure of the blood velocity. The difference frequency modulates a VHF oscillator so that an FM/FM signal is radiated. When the signal is received remotely, the modulating frequency is recovered and analyzed in terms of frequency to determine blood velocity. The telemetry range is over 300 meters. The flowmeter has been used for measurement of flow through the major vessels of various animals (dogs, seals, baboons, fish, alligators, birds, horses and turtles) in both acute and chronic preparations.

A66-81378
A SURVEY OF THEORETICAL APPROACHES TO MAGNETIC GROWTH INHIBITION.
Maximo Valentinuzzi (Inst. Nacl. de Microbiol., "Carlos G. Malbran," Lab. de Magnetobiol., Buenos Aires, Argentina).
(Second Intern. Biomagnetic Symp., Chicago, Nov. 29–30, 1963).
American Journal of Medical Electronics, vol. 5, First Quarter 1966, p. 35–39. 13 refs.

The essential concepts concerning magnetic field effects from the last century to the present are summarized, followed by a physicomathematical

analysis of concentration changes, thermodynamic modifications, and change of rotational diffusion. A theory of magnetic actions on growing biological systems may be summed up as: (1) Enzymatic reactions are essential to the interpretation and prediction of magnetobiological effects. (2) In enzymatic reactions an intermediate complex is formed between enzyme and substrate. (3) The enzymatic intermediate complex is a free radical. (4) The complex rotates. (5) The complex has specific reactive sites. (6) The complex collides with a structure which possesses specific reactive sites. (7) Some cybernetic mechanisms operate in the living object subjected to a magnetic field.

A66-81379
EVIDENCE THAT THE CENTRAL ACTION OF AMPHETAMINE IS MEDIATED VIA CATECHOLAMINES.
L. C. F. Hanson (Goteborg U., Dept. of Pharmacol., Sweden).
Psychopharmacologia, vol. 9, no. 1, 1966, p. 78–80. 10 refs.

Eighteen cats were trained to 100% negatively reinforced active conditioned response (CAR) on a buzzer signal. The following drugs were administered singly or in combination: reserpine 0.1 mg./kg., α-methyltyrosine (α-MT) 50 mg./kg., amphetamine 2 mg./kg., and L-3,4-dihydroxyphenylalanine (L-DOPA) 25 mg./kg. Reserpine lowered the CAR to 35%; α-MT in the dose employed was inactive. A combination of these two drugs abolished the conditioned response. Amphetamine restored the performance of reserpine-treated cats to normal, but had no significant effect in animals treated with both reserpine and α-MT. If the latter group received a subthreshold dose of L-DOPA the response was restored to normal within one hour. The ability of amphetamine to restore the CAR may be dependent on the presence of catecholamines in the brain.

A66-81380
THE ROLE OF INPUT RELEVANCE IN SENSORY ISOLATION.
Norman Rosenzweig and LaMaurice Gardner (Sinai Hosp., Dept. of Psychiat., Detroit, Mich.).
(Am. Psychiat. Assn., 121st Ann. Meeting, New York, May 3–7, 1965).
American Journal of Psychiatry, vol. 122, Feb. 1966, p. 920–927; discussion, p. 927–928.
Grant Sinai Hosp., Detroit, 64–7.

This investigation was designed to subject to systematic study the hypothesis that the effects of sensory isolation are due to the removal of meaningful information relevant to the solution of an internally perceived problem. Three experimental conditions were used in which auditory input was the only experimental variable not held constant. The three varieties of auditory input were: (1) white noise (no meaning); (2) recordings of playlets, puzzles, jokes, etc. (meaning present); and (3) tape recordings played backward (no meaning). The paper reports comparative effects produced in ten subjects in each condition as obtained from subjects' reports and psychological tests. The results suggest that heightened imagery seen in sensory isolation is related to depatterning of input, but that disturbances of concentration, sleep–wake confusion, emotional lability, impairment of reality testing, errors of visual retention and certain other cognitive and perceptual impairments seen are related to the absence of meaningful input.

A66-81381
EXPERIMENTAL ISOLATION: AN OVERVIEW.
Leo Goldberger (N.Y. U., Res. Center for Mental Health, New York).
(Brooklyn Psychiat. Soc., Meeting, Mar. 18, 1965).
American Journal of Psychiatry, vol. 122, Jan. 1966, p. 774–782. 65 refs.
NIH supported research.

This is a review of experiments in sensory deprivation and/or perceptual isolation. A phenomenological point of view is used to describe the isolation situation and individual differences in response to isolation. Certain parallels are drawn between the experimental isolation situation and that of the Rorschach test. The effects of isolation fall into (a) those due to the specific sensory alterations, and (b) those attributable to the general situation. These distinctions are related to the individual difference data on isolation reactions. Drive motivation was not observed directly, but there was some indirect evidence of drive activation particularly in maladaptive reactors.

A66-81382
STUDIES ON THE ABSORPTION OF CO^{58}-LABELLED VITAMIN B_{12} IN CHRONIC LEAD POISONING.
Z. Chojecki and H. Kowalski (Med. Acad. Dept. I of Internal Diseases and Isotope Center, Dept. of Radiol., Warsaw, Poland).
Polish Medical Journal, vol. 4, no. 2, 1965 p. 242–249. 13 refs.

Studies on $CO^{58}B_{12}$ vitamin absorption were performed in 14 patients with chronic lead poisoning and in 5 normal subjects. The hydrochloric acid in the gastric contents and plasma pepsinogen were determined in all patients. Deficiency or lack of hydrochloric acid were frequently observed in patients with chronic lead poisoning. Decrease of pepsin secretion was also noted and in some cases decreased secretion of the intrinsic factor was observed. The mean values of the intrinsic factor secretion expressed as the amount of excreted CO^{58} vitamin B_{12} in the Schilling test in the control group and in lead poisoning were 21.5 and 16.1%, respectively. The lack of the intrinsic factors secretion in lead poisoning was associated with achlorhydria and partial decrease of plasma pepsinogen activity but not with the signs of megaloblastic anemia in peripheral blood. The megaloblastic reaction in the course of lead poisoning may be explained by insufficient excretion of the intrinsic factor and exhaustion of the vitamin B_{12} liver storage.

A66-81383
NOTES ON THE TECHNIQUE OF DIRECT BALLISTOCARDIOGRAPHY AND THE ORIGIN OF BALLISTOCARDIOGRAPHIC WAVES ACCORDING TO PERSONAL INVESTIGATIONS.
L. Dec (Med. Acad., Dept. III of Internal Diseases, Dept. of Nephrol., Wroclaw, Poland).
Polish Medical Journal, vol. 4, no. 2, 1965, p. 271–277.

The results of studies performed by the author on the technique of direct ballistocardiography and the origin of the ballistocardiographic (BCG) waves are reported. The relation between the BCG tracings and the position of the BCG set, its weight, and the way of its adjoining to the tracing apparatus was demonstrated. Most distinct tracings were obtained from the region above the knees and from the pubic symphysis, the weight of the set being 300–600 g.

A66-81384
EXPERIMENTAL DATA TO SUBSTANTIATE THE MAXIMUM PERMISSIBLE CONCENTRATION OF SHALE GASOLINE IN THE ATMOSPHERE [EKSPERIMENTAL'NYE DANNYE K OBOSNOVANIIU PREDEL'NO DOPUSTIMOI KONTSENTRATSII SLANTSEVOGO AVTOBENZINA V ATMOSFERNOM VOZDUKHE].
V. A. Akmees (Central Inst. of Advan. Training of Physicians, Dept. of Communal Hyg., Moscow, USSR).
Gigiena i Sanitariia, vol. 31, no. 3, Mar. 1966, p. 3–8. 9 refs. In Russian.

Shale gasoline, obtained from oil shales during thermal treatment in tunnel and chamber ovens and subsequent refining and rectifying, when present at concentrations of 0.09 mg./m.^{3} and higher, has a pronounced biological effect on man and animals: changes occur mainly in the central nervous system. The threshold value of smell of shale gasoline is at the level of 0.3 mg./m.^{3}; the threshold value of the reflex action, determined by the electroencephalographic method, is at the level of 0.09 mg./m.^{3}. The latter is suggested as the one time maximum permissible concentration. Studying the shale gasoline resorption effect in chronic 24-hour poisoning of albino rats for a period of 106 days, concentrations of 6 and 0.6 mg./m.^{3} produced changes in the chronaxy of muscle-antagonists and in the content of vitamin C in the organs. Less pronounced shifts were noted in the content of phenol in the urine and that of sugar in the blood. On the basis of these investigations the author recommends the daily average maximum permissible concentration of gasoline to be set the level of 0.06 mg./m.^{3}. In the atmosphere around the shale chemical plant "Kiviyli" traces of hydrocarbons were discovered in a radius up to 400 m.

A66-81385
EFFECT OF PROLONGED FASTING ON THE EXPIRED $C^{14}O_2$ FROM PALMITATE AND GLUCOSE IN OBESE SUBJECTS.
Robert E. Bolinger, Michael E. Schafer, and Terrence T. Kuske (Kan. U., Med. Center, Clin. Res. Center, Kansas City).
Metabolism, vol. 15, May 1966, p. 394–400. 15 refs.
Grants PHS FR-67 and A-504.

Nine grossly obese patients were studied; first in the feeding state and then after a period of starvation. The appearance of $C^{14}O_2$ in the expired air was determined by the use of the Cary Respiration Pattern Analyzer following the injection of carbosyl-labeled palmitate and C-1-labeled glucose. The decay curve for the specific activity of the $C^{14}O_2$ is complex and shows several components in the feeding state. In starvation, however, the curve tends to approach a first order relationship. In the feeding state, the excretion of labeled material following palmitate falls off more rapidly in the respiration than it does in the starvation state. The total 24-hour excretion of C^{14} is somewhat greater in the starvation than in the feeding state. Changes following injection of C^{14} glucose are of a similar, although much less significant degree. The total 24-hour excretion of C^{14} from glucose is somewhat decreased following the starvation state in contrast to palmitate. These findings are consistent with the hypothesis that in the starvation state the metabolism of fat continues at a more rapid rate than during feeding and that the metabolism of glucose tends to decrease.

A66-81386
ELECTROLYTE AND LIPID METABOLISM OF LEAN FASTING MEN AND WOMEN.

Walter Lyon Bloom, Gordon Azar, and James E. Clark (Piedmont Hosp., Ferst Res. Center, Atlanta, Ga.)
Metabolism, vol. 15, May 1966, p. 401–408. 11 refs.
Grant PHS HE 05301-05.

Total plasma lipid, cholesterol, and free fatty acid were measured during a four-day fast of seven lean men and seven lean women. Urinary excretion of sodium, potassium, and creatinine was measured. All parameters of fat metabolism increased more rapidly in women when rate of fasting was defined by negative caloric balance rather than time. No sex difference was found in sodium or potassium excretion. The potassium to creatinine ratio was lower in lean fasting men than women.

A66-81387
CHANGES IN HEART SIZE AND PLASMA VOLUME DURING FASTING.
Walter Lyon Bloom, Gordon Azar, and Ernest G. Smith, Jr. (Piedmont Hosp., Ferst Res. Center, Atlanta, Ga.)
Metabolism, vol. 15, May 1966, p. 401–408. 11 refs.
Grant PHS HE 05301-05.

Heart size was determined by standard six foot X-rays of the chest before and after fasting on 21 patients. Plasma volume by means of measurement of apparent volume of distribution of albumen tagged with I^{131} was measured in seven of these patients. The findings indicated that the heart size decreased in all patients studied and that a significant decrease in plasma volume was found during fasting in each subject. No correlation was found between change in heart size or blood volume and amount of weight loss or duration of fasting. All subjects were ambulatory and changes were not related to bed rest. The findings were related to the saluresis of fasting.

A66-81388
EVALUATION OF THE HUMAN HEAT LOAD [HODNOCENI TEPELNE ZATEZE CLOVEKA].
Miloslav Jokl and Jan Roubal (Ustav Hygieny práce a chorob z povolaní, Prague, Czechoslovakia).
Pracovní lékařství, vol. 18, Mar. 1966, p. 49–53. 16 refs. In Czech.

A new evaluation type of man's heat stress is presented, based on four criteria: the so-called total heat load, the total hyper- or hypothermic load, the unequalness and the change of the heat load. These factors make possible also the determination of an effective work-time during the shift, the work duration under extremely unfavorable heat conditions, the permissible unequalness of the heat load of the human surface, the change of the heat load especially when passing from warm to cool environment and the introduction of maximum permissible values of excessive heat and cold load. The total heat load may be calculated from the measured values by determining the quantity of excreted sweat, and is expressed in thermal units (W/m^2). The total hyper- or hypothermic load is given by the heat flow accumulated in the human body determined from the thermic balance equation, which again is expressed in (W/m^2). The change of the heat load is the difference between the total heat load in the new and the original environment (W/m^{-2}). The unequalness of the heat load is the dimensionless ratio of the heat load on the part of the body surface under higher load (e.g., irradiated) to the total heat load of the body.

A66-81389
DYNAMICS OF SOME PHYSIOLOGICAL PARAMETERS DURING OVERPRESSURE: RESPIRATION IN PEOPLE WITH A GOOD TOLERANCE OF INTRAPULMONARY OXYGEN OVERPRESSURE [DYNAMIKA NEKTERYCH FYZIOLOGICKYCH PARAMETRU PRI PRETLAKOVEM DYCHANI U OSOB S DOBROU SNASENLIVOSTI INTRAPULMONALNIHO PRETLAKU KYSLIKU].
Jiří Scačinka and Jan Hospodář (Ustav leteckého zdravotnictví, Prague, Czechoslovakia).
Pracovní lékařství, vol. 18, Mar. 1966, p. 54–56. 7 refs. In Czech.

Certain physiological functions were followed up during oxygen respiration with an intrapulmonary overpressure of 33 torr and/or with an overpressure of up to 74 torr, compensated by a special suit. The investigation was carried out in a group of flyers who finished their training and had a satisfactory intrapulmonary overpressure tolerance. The pulse rate increased according to the overpressure value; its increase was lower when a compensation suit was used. The electrocardiogram showed symptoms of vegetative irritability; no signs of overloading of the right heart or of ischemia of the myocardium were found. The respirational arythmia was considerable; its disappearance indicates an increasing adaptability of the organism. No serious disorders of the heat rhythm were observed. The systolic, diastolic, and mean blood pressure increased in every case. The pulse pressure without compensation decreased; during compensation it oscillated around the initial values. The oscillation of these values indicates a worse adaptability to overpressure respiration.

A66-81390
DYNAMICS OF SOME PHYSIOLOGICAL PARAMETERS DURING OVERPRESSURE: RESPIRATION IN PEOPLE WITH BAD TOLERANCE OF INTRAPULMONARY OVERPRESSURE [DYNAMIKA NEKTERYCH FYZIOLOGICKYCH PARAMETRU PRI PRETLAKOVEM DYCHANI U OSOB SE SPATNOU SNASENLIVOSTI INTRAPULMONALNIHO PRETLAKU KYSLIKU].
Jan Hospodář, and Kiří Svačinka (Ustav leteckeho zdravotnictví, Prague, Czechoslovakia).
Pracovní lékařství, vol. 18, Mar. 1966, p. 57–60. 11 refs. In Czech.

The criteria of an insufficient adaptability of the organism to oxygen respiration with intrapulmonary overpressure were determined; the criteria are applicable also for individual evaluation. In persons with a lower overpressure tolerance the pulse rate increases, decreases, or considerably oscillates during respiration; in most cases the oscillation of the isoelectric plane of the standard electrocardiogram leads is enlarged and the synchronization with breath as well as respiration arythmia disappear. The changes of the breath frequency are not early symptoms of bad overpressure tolerance, whereas a progressive decrease of the blood pressure is one of the early symptoms of the imminent collapse.

A66-81391
SYNCHRONIZATION BETWEEN CIRCULATION AND RESPIRATION IN MAN [SYNCHRONISMEN ZWISCHEN KREISLAUF AND ATMUNG AM MENSCHEN].
P. Hinderling and K. Bucher (Basel U., Pharmakol. Anstalt, Switzerland).
Helvetica physiologica et paharmacologica acta, vol. 23, no. 4, 1965, p. 374–381. 8 refs. In German.

This article deals with a special type of synchronization existing between the circulatory and respiratory systems, which was first found in rabbits. Investigations made under anesthesia on 15 healthy persons of various ages, both male and female, showed that the same type of synchronization may often be found in humans and occasionally even very high values may be recorded.

A66-81392
COMMUNITY NOISE—A SOCIO-PSYCHOLOGICAL STUDY IN DEFINED ENVIRONMENT: EXPERIMENTAL PILOT STUDIES ON THE OCCURRENCE OF NOISE ANNOYANCE AND ITS CONNECTION WITH SOME PSYCHOLOGICAL VARIABLES [SAMHALLSBULLER—EN SOCIOLOGISK-PSYKOLOGISK STUDIE: EN PROVUNDERSOKNING OVER FOREKOMSTEN AV BULLERBESVAR OCH DERAS SAMBAND MED VISSA PSYKOLGISKA VARIABLER].
O. Arvidsson, C. R. Johansson, K. Olsson, and H. Wigeman (Lund U., Inst. för hyg., Psykol. inst. och Sociol. inst., Sweden).
Nordisk hygienisk tidskrift, vol. 46, no. 4, 1965, p. 153–188. 19 refs. In Swedish.

Non-wage-earning women between the ages of 20 and 60 years of age were divided into disturbed and non-disturbed groups to test (1) the noise annoyance of traffic suffered by the city population in Lund, Sweden, and (2) its connection with human psychological disposition. In the noisy district (passage of more than 6,300 vehicles per day), more persons were disturbed (60%) than in the quiet district (passage of less than 2,300 vehicles per day) (31%). This significant difference was independent of age, social group, and living density. There was a connection between liking the area and experienced noise annoyance. No definite degree of subjective adaptation to noise was established. In further psychological and audiological investigation, the defense structure I (isolation) was evenly distributed among the groups, and the Defense Mechanism Test supported to some extent a hypothesis concerning a similar psychological reaction pattern in relation to environmental stimuli for the disturbed in the noisy district and the non-disturbed in the quiet district. They differed concerning the relative distribution of psychological defense mechanisms from non-disturbed persons in the noisy district and disturbed persons in the quiet district, who, according to psychological tests, seem to have a tendency for poorer adaptation to reality.

A66-81393
NOSE BREATHING IN SPORTSMEN [K OTAZCE NOSNIHO DYCHANI U SPORTOVCU].
V. Hlávaček, J. Pihrt, and A. Vítová (Karlova U., Lékařské fakulty hygienické Otolaryngol. klin. and Datedra hyg. prace, Prague, Czechoslovakia).
Ceskoslovenska otolaryngologie, vol. 15, Mar. 1966, p. 68–73. 6 refs. In Czech.

One hundred and twelve cyclists from 19 countries, participants of the peace competition Prague—Warsaw—Berlin 1963, were examined. They revealed a number of pathological changes in the upper respiratory pathways and some adverse anatomical deviations in the nasal sinuses which exert an adverse effect on nasal breathing. Next the authors studied the relationship of auxiliary mouth breathing on the nasal passage in experimental subjects by means of the step test after artificial obstruction of the nasal openings. They provided evidence that an increase of inspiration resistance by approximately 15 mm. of H_2O column reduced in almost half of the experimental

subjects the activity which equals approximately 33% of the maximum performance according to Astrand (1952). Finally the authors emphasize that with regard to prevention of diseases of the lower respiratory pathways, compulsory ear, nose, and throat examinations should be introduced for subjects engaged in strenuous sports activities.

A66-81394
BIOMEDICAL ASPECTS OF SPACE FLIGHT
James P. Henry (U. of Southern Calif., Los Angeles).
New York, Holt, Rinehart and Winston, 1966. 184 p. 33 refs.
$2.95

A semi-technical survey of studies on the physiology of man in space is presented. The effects of reduced atmospheric pressure and oxygen partial pressure (oxygen tension, protection by oxygen equipment, pressure suits, problems of gas expansion, and oxygen poisoning) are followed by discussions of terrestrial gravity and acceleration; biomedical problems of weightlessness; self-sustaining systems of space vehicles; hazards of; and protection against, solar and cosmic radiation, radio and heat waves, visible light, and short wave radiation; man–machine systems; the designing of space vehicles and controls; and the selection and training of astronauts.

A66-81395
LYSOSOMAL MODIFICATIONS AFTER ADMINISTRATION OF RADIOPROTECTIVE DRUGS.
J. Hugon, J. R. Maisin, and M. Borgers (C.E.N.-S.C.K., Lab. de Microscop. Electron., Radiobiol., Mol, Belgium).
Experientia, vol. 22, Apr. 15, 1966, p. 235–236. 11 refs.
Contract A.I.E.A./C.E.N. no. 347 RB; and Fonds de la Rech. Sci. Fondamentale Collective supported research.

Histological examination of the epithelium from the duodenal crypts of mice disclosed a number of inclusions in the cellular vacuoles after administration of several radioprotective compounds. Fasting animals were given 16 mg. glutathione orally, followed in 15 min. by the intraperitoneal injection of 8 mg. AET (S^{35}-2-β-aminoethylisothiourea bromide), and, 5 min. later, by 1 mg. of serotonin. Three hours after the injection, dense bodies with dark fibrillar content were observed in the middle of the cell, above the nucleus. In 24 hrs. these bodies were dilated and pushed to the vacuole. The positive test for acid phosphatase activity and other histological characteristics identify these structures as enlarged lysosomes. The observations show that radioprotectors and their intermediary products are collected in special parts of the ergastoplasm and form vacuoles into which lysosomal enzymes are poured, and that these drugs are not easily metabolized. The lytic activity must be caused by AET, because glutathione or serotonin given separately did not provoke similar lesions.

A66-81396
PRESYNAPTIC AND POSTSYNAPTIC INHIBITION ON TRANSMISSION OF CUTANEOUS AFFERENT VOLLEYS THROUGH THE CUNEATE NUCLEUS DURING SLEEP.
G. Carli, K. Diete-Spiff, and O. Pompeiano (Pisa U., Ist. di Fisiol.; and C.N.R. Sez. di Pisa, Centro di Neurofisiol. e Gruppo d'Elettrofisiol., Italy).
Experientia, vol. 22, Apr. 15, 1966, p. 239–240. 5 refs.
Grant PHS NB-02990-05.

Modulation of the orthodromic lemniscal response elicited by single shock stimulus of the superficial radial nerve during sleep was studied in cats with implanted electrodes. The electroencephalograms, electromyograms of the posterior cervical muscles, and the electrooculograms showed that during rapid eye movements characteristic of desynchronized sleep both presynaptic and post-synaptic inhibition affected the cuneate nucleus. The phasic depression of the orthodromic response evoked in the medial lemniscus by cutaneous afferent volley occurred during the burst of rapid eye movement. The mechanism of this reaction is discussed.

A66-81397
EFFECT OF ACUTE AND EXHAUSTIVE EXERCISE UPON THE FINE STRUCTURE OF HEART MITOCHONDRIA.
R. P. Laguens, B. B. Lozada, C. L. Gómez Dumm, and A. R. Beramendi (Fac. de Cienc. Méd., Com. de Invest. cienc. de la prov. de Buenos Aires, La Plata; and U. del Salvador, Fac. de Med., Buenos Aires, Argentina).
Experientia, vol. 22, Apr. 15, 1966, p. 244–246. 7 refs.

Dogs were submitted to acute physical stress by forced swimming in 24°C. water until exhaustion and sinking. Histological sections of the cardiac muscle revealed mitochondria of extremely large size. In some cases the mitochondrial mass represented more than half of the myocardial area. The increase of mitochondrial size appeared to be due to fusion of individual mitochondria, increase in size of normal cristae, or swelling. Partial vacuolization and disruption of crista were also noted. These changes resemble those found after functional overload and ischemia. They appear to take place very rapidly.

A66-81398
VERTIGO.
Franz Altmann (Columbia U. Coll. of Physicians and Surgeons, New York City, N. Y.)
Academy of Medicine of New Jersey Bulletin, vol. 11, Dec. 1965, p. 303–309.

True vertigo is not only the result of labyrinthine disease but also of certain retrolabyrinthine disorders. The etiology, symptoms, and diagnostic difficulties of this disease are presented. In order to better understand the symptomatology of the changes involving the various branches of the internal auditory artery, a short review of the most common types of ramification of this artery are stated.

A66-81399
NEUROANATOMY AND NEUROPHYSIOLOGY OF DIZZINESS.
Francis M. Fodor (N.Y. Eye and Ear Infirmary, New York City).
Academy of Medicine of New Jersey Bulletin, vol. 11, Dec. 1965, p. 310–318.

The four major types of dizziness are described, followed by an explanation with diagrams, of the brain system which controls equilibrium and the vestibular sense and reflex apparatus. Outside of otology, the influence of the deep sensation and proprioceptors, vision, and the vestibular end organ should also be considered. Diagrams and explanations of the mechanism of spontaneous vestibular symptoms and vestibular nystagmus are also furnished.

A66-81400
SOME NEUROLOGICAL ASPECTS OF DIZZINESS.
Malvin Cole (N. J. Coll. of Med., Dept. of Neurol., Jersey City).
Academy of Medicine of New Jersey Bulletin, vol. 11, Dec. 1965, p. 319–326. 28 refs.

A review is presented of the symptoms and the lesions causing dizziness, including vertigo and nystagmus. Vestibular function tests used to determine the symptoms include the Bárány chair, caloric examination, and nystagmography. In addition, tests of cochlear function are used, such as Békésy audiometry, SISI (short increment sensitivity index), and Fowler's Binaural Balance Technique. Other tests of hearing include Sensorineural Acoustic Level, Speech Alternate Masking Index (SWAMI), and Tone Decay. Peripheral and central vertigo are differentiated.

A66-81401
NEGLECT OF STIMULUS INFORMATION IN A TWO-CHOICE TASK.
G. S. Tune (Harvard U., Cambridge, Mass.)
Journal of General Psychology, vol. 74, Apr. 1966, p. 231–236.

Twenty-five subjects were assigned to a two-choice task with the events "1" and "0" used at five redundancy levels. Five guessing levels (10–50% of the events) were randomly interpolated into the stimulus series and combined to give 25 conditions. The results indicate that the subjects did not use the stimulus information and that there was no significant probability matching. It is suggested that the subjects were left with their own response preferences as the only source of information.

A66-81402
PERSONALITY CORRELATES OF COGNITIVE DISTURBANCES IN SHORT-TERM SENSORY ISOLATION.
Henry V. Leon and George H. Frank (Miami U., Dept. of Psychol., Coral Gables, Fla.)
Journal of General Psychology, vol. 74, Apr. 1966, p. 273–277. 14 refs.

Subjects were defined on the basis of personality characteristics by the Thurstone Temperament Schedule (TTS) and placed in an experimental isolation-sensory deprivation situation for two hours, with their resultant behavior viewed in light of their personalities. Isolation Disturbance, Imagery Disturbance, and Time Disturbance Scores for each of the 26 subjects were converted to rank-order positions and compared with each of the seven TTS scores. The correlations obtained indicated: (1) introverted subjects tend to show significantly more disturbance in isolation than do extroverted subjects, and (2) physically active (manual activity) individuals report significantly greater time disturbance than do the low (manual) activity subjects. The findings constitute only a weak support of the hypothesis regarding the influence of personality characteristics upon cognitive activity in an isolation situation, since only three correlations were significant out of the 21 comparisons. This finding does not go beyond change expectation for 21 comparisons.

A66-81403
A SCALE OF BIDIRECTIONAL SIMILARITY.
J. H. Brown (Va. U., Dept. of Psychol., Charlottesville).
Journal of General Psychology, vol. 74, Apr. 1966, p. 339–345. 5 refs.

Sets of ambiguous stimuli built around reversible figures were constructed, scaled, and validated. Positions on a continuum of bidirectional

similarity were determined in terms of per cent similarity to each of two referent prototypes, similarity being defined by the probability of eliciting either one of two responses. Variations of eight basic prototypes were constructed by systematically superimposing one prototype upon another, the degree of super-position being varied in gradual steps from little to complete. The scaling was conducted by 102 undergraduates. Stimulus selection was made on the basis of multiple criteria. The resultant scales were validated by two groups of 18 subjects each.

A66-81404
SHORT-TERM RETENTION AS A RATIO OF AVERAGE STORAGE LOAD TO AVERAGE LOAD REDUCTION.
Kenneth E. Lloyd, William A. Johnston, and Sandra A. Belcher (Wash. State U., Dept. of Psychol., Pullman).
Journal of General Psychology, vol. 74, Apr. 1966, p. 347–353.
Grant AFOSR 256-63

An attempt was made to relate short-term recall to a ratio of the average number of items being stored (when a request for recall occurred) to the average number of items requested. When the ratio is unity, all stored items are requested. As the ratio departs from unity, fewer items are requested per recall in relation to the number being stored. Mean recall errors increase as the ratio increases. The shape of the function remains constant despite changes in the ease with which the stored items can be encoded. Within any one ratio, the recall scores are rank ordered directly with both variables in the ratio.

A66-81405
TEMPERATURE DISTRIBUTIONS IN THE HUMAN THIGH, PRODUCED BY INFRARED, HOT PACK AND MICROWAVE APPLICATIONS.
Justus F. Lehmann, Donald R. Silverman, Barbara A. Baum, Nancy L. Kirk, and Vilas C. Johnston (Wash. U., U. Hosp., Dept. of Phys. Med. and Rehabil., Seattle).
(Am. Congr. of Phys. Med. and Rehabil., 43rd Ann. Session, Philadelphia, Aug. 26, 1965).
Archives of Physical Medicine and Rehabilitation, vol. 47, May 1966, p. 291–299. 16 refs.
Grant Vocational Rehabil. Admin. RT-3

Luminous heat, infrared, and hot pack applications acted only as superficial heating agents. Microwaves at the frequency of 900 megacycles or below were most effective in heating the musculature whereas microwaves at 2456 megacycles, even though they produced temperature distributions different from those of superficial heating modalities, were not so effective in therapy as would be destrable for deep heating agents.

A66-81406
VASCULAR BASIS FOR PAIN DUE TO COLD.
David I. Abramson, Samuel Tuck, Jr., Siu W. Lee, George Richardson, and Luke S. W. Chu (Ill. U., Coll. of Med., Dept. of Phys. Med. and Rehabil., Chicago).
(Am. Congr. of Phys. Med. and Rehabil., 43rd Ann. Session, Philadelphia, Aug. 26, 1965).
Archives of Physical Medicine and Rehabilitation, vol. 47, May 1966, p. 300–305. 8 refs.
Grant NIH H-2568.

The basis for pain elicited by exposure of the hand to cold was studied in nine normal men. One hand of each subject was immersed in a cold bath at 11–14°C. for an initial period of one hour. Blood flow determinations were obtained using the venous occlusion plethysmographic method, and the subject's symptoms were recorded. Following this general heating of the subject was carried out for 40 min. Exposure of the hand to cold elicited initially a sensation of coldness and, later, numbness, which in some instances was associated with burning and pain. At the same time blood flow in the hand decreased markedly. With the production of general heating, the discomfort became less and eventually the coldness and numbness disappeared. Such changes were associated with a marked increase in blood flow to the hand. After termination of heating, the symptoms returned, at which time there was a sharp decrease in blood flow. It is concluded that cold produces symptoms of coldness, pain, and numbness by means of vasoconstriction. Whether or not the responsible mechanism is anoxia of peripheral nerves, as a consequence of reduction of blood flow, could not be determined from the study. No support was obtained for the view that cold has a direct blocking or inhibiting effect on nervous tissue.

A66-81407
FLUORESCENCE STUDIES ON A RED ALGA, PORPHYRIDIUM CRUENTUM.
Anne Drey and Govindjee (Ill. U., Dept. of Botany and Dept. of Physiol. and Biophys., Urbana).
Biochimica et Biophysica Acta, vol. 120, May 12, 1966, p. 1–18. 37 refs.
Grant NSF GB 4040.

Fluorescence intensities (F) as a function of exciting light intensities (I) were measured under steady-state conditions in the red alga Porphyridium cruentum. They showed an increase in differential fluorescence yield (dF/dI) upon excitation with 544-mu light (System II), but not with blue light (System I). On the basis of these results and the difference excitation spectra between excitation with and without green background light, it is shown that this change, showing extra fluorescence at "high" light intensities, is essentially due to light absorbed in System II. Upon addition of 3(3,4-dichlorophenyl)-1, 1-dimethylurea, a difference emission band at 692 mu was observed (at low intensities) between the emission spectra of poisoned and unpoisoned cells in Porphyridium. This band is suggested to originate in the reaction center in System II. Low-temperature (–196°) emission spectra were measured in Porphyridium upon excitation in Systems I and II. Three clearly distinguishable peaks at 685 mu, 696 mu and 712 mu (and a shoulder at 740 mu) were observed upon excitation with green light (System II). However, excitation with blue light (System I) produced a dominant peak at 712 mu, whereas the 685-, 696- and 740-mu bands appeared only as shoulders. Since the 696-mu peak is more pronounced in the case of excitation in System II, and the 712-mu peak for excitation in System I, it is suggested that the 696-mu band originates in System II and the 712-mu band in System I. That the 696-mu band and the 712-mu band belong to different molecular species is also suggested by their different rate of decrease in fluorescence intensity with increasing temperature. In the –196° to –185° range, the rate of decrease of fluorescence intensity of the 696-mu band is several times higher than that for the 712-mu band.

A66-81408
FLUORESCENCE STUDIES ON DEUTERATED CHLORELLA VULGARIS.
Ashish K. Ghosh, Govindjee (Ill. U., Dept. of Botany, Urbana), H. L. Crespi, and J. J. Katz (Argonne Natl. Lab., Ill.)
Biochimica et Biophysica Acta, vol. 120, May 12, 1966, p. 19–22. 9 refs.
Grant NSF GB 4040 and AEC supported research.

Chlorella vulgaris grown in 99.8% heavy water shows absorption spectra similar to the absorption spectra shown by that grown in ordinary water; there appears to be a minor shift of about 1 mu towards shorter wavelengths in the blue and the red absorption bands, and a slight increase in chlorophyll b to a, and carotenoids to chlorophyll a ratios in the heavy-water cells. Fluorescence (emission) spectra of deuterated Chlorella show an emission peak which is shifted about 2.0 mu towards shorter wavelengths. In addition, the ratio of fluorescence at the main peak to fluorescence at 730 mu is lower in the heavy-water cells, suggesting that they might have more of chlorophyll a_1 fluorescence. The yield of fluorescence is about 20–30% higher in deuterated Chlorella (measured at the emission peak). The excitation spectra of fluorescence show that the energy transfer from chlorophyll b to chlorophyll a at 670 mu is almost 100% in both deuterated and ordinary hydrogen cells.

A66-81409
ENERGY- AND ELECTRON-TRANSFER SYSTEMS IN ALGAL PHOTOSYNTHESIS. I. ACTIONS OF TWO PHOTOCHEMICAL SYSTEMS IN OXIDATION-REDUCTION REACTIONS OF CYTOCHROME IN PORPHYRA.
Mitsuo Nishimura and Atusi Takamiya (Tokyo U., Fac. of Sci., Dept. of Biophys. and Biochem., Hongo, Japan).
Biochimica et Biophysica Acta, vol. 120, May 12, 1966, p. 45–56. 20 refs.
Yamamoto Nori Co and Fisheries Agency supported research.

The light-induced oxidation-reduction reactions of Porphyra-cytochrome-533 in the living thalli and isolated particles of three species of Porphyra (P. yezoensis, P. tenera and P. suborbiculata) were studied. The action spectrum of cytochrome oxidation had a maximum at 685–690 mu. In the presence of background illumination of 680–700 mu, photochemical reduction by a second light of wavelengths shorter than 650 mu was observed. The maxima of the action spectrum for the reduction were located at 565 mu and 615–620 mu. This reduction of cytochrome by light absorbed by phycobilins was inhibited by 5-bromo-3-isopropyl-6-methyluracil, 3(4-chlorophenyl)-1,1-dimethylurea, 2-chloro-4,6-bis-(ethylamino)-1,3,5-triazine, 3,4-dichloropropionanilide and O-phenanthroline. These substances neither inhibited the light-induced oxidation of cytochrome, nor the dark reduction of cytochrome. In the presence of these substances, light-induced oxidation of cytochrome was observed on illumination of the light absorbed by phycobilins as well as by chlorophyll a. Effects of incident light intensity, dark period, inhibitors, gas phase, etc, on the rates and the steady-state change of the cytochrome reactions were investigated. Comparison of the observed amount of cytochrome change and the amounts of cytochrome-553 extracted from the thalli indicated that the major portion of the cytochrome-553 present in the thalli changed its oxidation-reduction state on illumination. The quantum yield of cytochrome oxidation by light absorbed by chlorophyll a was about 0.14. In the presence of 5-bromo-3-isopropyl-6-methyluracil, quantum yields with light absorbed by chlorophyll a and with light absorbed, by phycobilins were about 0.15 and 0.11, respectively.

A66-81410
THE ROLE OF PLASTOQUINONE IN THE PHOTOSYNTHETIC REACTIONS OF ANABAENA VARIABLIS.
James J. Lightbody and David W. Krogmann (Wayne State U., Dept. of Chem., Detroit, Mich.)
Biochimica et Biophysica Acta, vol. 120, May 12, 1966, p. 57–64. 16 refs. Grant NIH GM-07658.

The role of plastoquinone in the photosynthetic reactions of cell-free preparations of the blue-green alga, Anabaena variabilis, was studied. Plastoquinone is required for the reduction of several oxidants in the Hill reaction, but is not required for the photoreduction of TPN+ (triphosphopyridine nucleotide) when either reduced indophenol dye or N,N,N',N'-tetramethyl-p-phenylenediamine is used as the electron donor instead of water. Also, plastoquinone is not required for the photooxidation of reduced cytochrome c. The synthesis of ATP (adenosine triphosphate) elicited by phenazine methosulfate (PMS) is dependent on the presence of plastoquinone in the preparations from A. variabilis. The light-triggered hydrolysis of ATP is apparently independent of plastoquinone while the light-dependent hydrolysis of ATP required plastoquinone.

A66-81411
THE INHIBITORY EFFECT OF LIGHT ON GROWTH OF PROTOTHECA ZOPFII KRUGER.
Bernard Epel and Robert W. Krauss (Md. U., Dept. of Botany, College Park).
Biochimica et Biophysica Acta, vol. 120, May 12, 1966, p. 73–83. 14 refs. NASA Grant NsG 70-60 and Md. U. supported research.

White light from cool-white fluorescent lamps is inhibitory to the growth of Prototheca zopfii Kruger, an alga, Saccaromyces cerevisiae Hansen, a yeast, and Tetrahymena pyriformis Lwoff, a protozoan. The growth rate for Prototheca was found to drop linearly with increasing light intensity from 4.35 doublings-per day to less than half a doublind per day at 1200-ft.-candle. Incandescent light of equal intensity was less inhibitory, but radiation from "blacklight" fluorescent lamps was more inhibitory. The action spectrum for this inhibition of growth was localized in the near-ultraviolet region of the spectrum as well as in the blue end of the visible spectrum with a major peak of 420 mu. A small secondary peak was present between 500 and 600 mu. The most likely receptor appears to be a cytochrome. The inhibition may be a major factor in the phenomena of light-dark-induced synchrony in green algae.

A66-81412
RESISTANCE OF ANIMAL ORGANISM TO THE EFFECT OF CERTAIN CHEMICALS AND PHYSICAL STRESS CHANGES UNDER THE INFLUENCE OF VIBRATION [IZMENENIE USTOICHIVOSTI ORGANIZMA ZHIVOTNYKH POD VLIIANIEM VIBRATSII K VOZDEISTVIIU NEKOTORYKH KHIMICHESKIKH PREPARATOV I FIZICHESKOI NAGRUZKI].
V. A. Kozlov, P. P. Saksonov, N. N. Dobrov, V. V. Antipov, and V. S. Parshin.
Doklady Akademii Nauk SSSR, vol. 167, no. 4, Apr. 1, 1966, p. 925–927. 6 refs. In Russian.

White mice subjected to vibration of 70 c.p.s., 0.4 mm. amplitude, for one hour did not show any effect when subsequently subjected to exhaustive swimming as a measure of tolerance to physical stress. The injections of 400 mg./kg. of cystamine hydrochloride before or after vibration stress reduced the physical tolerance. At the same time, vibration increased the toxic effect of cystamine and also of strychnine nitrate. Both compounds are considered to be prophylactic and therapeutic measures which could be used during long missions into space, but their application may be limited due to the adverse effect of vibration.

A66-81413
MAGNETIC FIELD AS A STIMULUS [MAGNITOE POLE KAK RAZDRAZHITEL'].
IU. A. Kholodov.
IN: BIONIKA.
Adademiia Nauk SSSR, Moscow, 1965, p. 278–289. 28 refs. In Russian.

Magnetic field stimulus was used to test conditioned reflex, brain electrical potentials, and motor activity of fish, birds, and rabbits. Magnetic field affected physiological processes, but the stimulating effect of the magnetic field was weaker than that of light or sound, and it depended on the functional state of the central nervous system. The motor activity was higher in the presence of the magnetic field after intramuscular injections of 50 mg./kg. of caffeine. Bilateral enucleation in fish produced no change in the magnetic field effect which remained even after injuries of forebrain or cerebellum, but damage of diencephalon disrupted this effect. There was no change in the cortex biopotentials, but it may be assumed that glial structures are involved in this effect.

A66-81414
BIOLOGICAL INDICATION OF SUPERHIGH FREQUENCY ELECTROMAGNETIC FIELDS [BIOLOGICHESKAIA INDIKATSIIA ELEKTROMAGNITNOGO POLIA SVCH].
A. N. Malakhov, I. V. Romanhov, Iu. V. Smirnov, and M. Iu. Ul'ianov.
IN: BIONIKA.
Akademiia Nauk SSSR, Moscow, 1965, p. 302–305. In Russian.

Pierocercoids, fish, and mice were used for detection of electromagnetic field of superhigh frequency. In pierocercoids, the exposure to the electromagnetic field increased movements at the beginning of the experiment, but after 60 min. the movements ceased temporarily. Death occurred in some specimens after 24 hrs. Longer exposure increased the percentage of death. Because fish are hosts to these organisms, it may be assumed that fish can serve as detectors of electromagnetic fields. In mice, the conditioned reflexes to electromagnetic field of superhigh frequency required prolonged exposure, had a short-lived expression, and fast extinction, which indicated a low value of information in the life-pattern of the animals.

A66-81415
POSSIBLE INTERACTION OF MAGNETIC FIELD AND BIOLOGICAL SUBJECTS [VOZMOZHNOE VZAIMODEISTVIE MAGNITNOGO POLIA I BIOLOGICHESKIKH OB'EKTOV].
B. A. Neiman.
IN: BIONIKA.
Akademiia Nauk SSSR, Moscow, 1965, p. 381–382. In Russian.

Variation in the value of the electromagnetic field and the velocity of its changes may affect animal organisms as solar flares affect certain diseases. The author proposes that pilots at high altitudes and spacemen must be influenced to some degree by changes in the magnetic field, which may cause specific diseases, because experimental results showed that an electromagnetic field created about a wrist caused changes in blood circulation.

A66-81416
ADAPTIVE MECHANISMS IN HUMANS.
Jacques Leblanc (Laval U., School of Med., Dept. of Physiol., Quebec City, Canada).
Annals of the New York Academy of Sciences, vol. 134, Art. 2, Feb. 28, 1966, p. 721–732. 40 refs.
Grant Can. Defence Res. Board 9310-79.

All stressing conditions or environments are opposed by specific and nonspecific reactions. The reactivity to all types of stress depends on individual characteristics. Similarly, the responses to adverse conditions are greatly influenced by repeated exposure and contact. This influence is generally characterized by a decline in the specific responses and reactions normally experienced on acute exposure. Giving cold as an example, adaptation, when achieved, results in a decreased caloric cost and a reduction of the psychological disturbance of shivering and possibility to sleep at colder temperatures. For nonspecific reactions, identified primarily as signs of hyperactivity of the sympathetic system, adaptation is also possible. It is suggested that this type of adaptation which also brings a decline in reactions, originates in the central nervous system through habituation. All the mechanisms of adptation minimize the responses of the organism and consequently broaden homeostasis.

A66-81417
PHYSIOLOGICAL INDIVIDUALITY.
Frederick Sargent II and Karla P. Weinman (Ill. U., Dept. of Physiol. and Biophys., Urbana).
Annals of the New York Academy of Sciences, vol. 134, Art. 2, Feb. 28, 1966, p. 696–719. 37 refs. Comment on the paper by A. J. Angyan (Willowbrook State School, Research, Staten Island, N. Y.), p. 720.
Grant NIH A-4210.

Physiological individuality, indeed human variability, manifests itself most distinctively in functioning of organs or physiological regulations. This variability is most probably an expression of genetically controlled phenotypic adaptive plasticity. The manner in which various homeostatic mechanisms are mobilized in reaction to environmental change is, to some extent, an individual characteristic. That is, individuals utilize similar homeostatic mechanisms to achieve comparable adaptive responses but each draws on quantitatively different configurations of component regulatory processes. This individuality makes human physiological research more difficult, to be sure, but the fact that the biology of this variability is meaningful makes that same research the more challenging.

A66-81418
THE EFFECTS OF CLIMATE ON GROWTH.
Phyllis B. Eveleth.
Annals of the New York Academy of Sciences, vol. 134, Art. 2, Feb. 28, 1966, p. 750–759. 38 refs.
Grant Natl. Inst. of Mental Health MF9379-C1

A review has been made of past researches on the effect of a hot climate upon individual variation. As an illustrstion of this, the author's study on American children growing up in Rio de Janeiro, Brazil, has been cited.

These children were found to average smaller weights, heights, calf girths, and to have less weight/height and slimmer legs than children of similar background within the United States. Boys also average shorter stem length, leg length, and shoulder width in Rio. There are smaller biannual gains in weight and calf girth in both sexes in Rio. Menarche occurs at the same median age in both climates, but the eruption of permanent dentition was advanced in Rio boys and girls. These changes are suggested to be the result of heat stress.

A66-81419
EFFECTS OF PHYSIOLOGICAL AND CLINICAL FACTORS ON RESPONSE TO HEAT.
Douglas H. K. Lee and Austin Henschel (PHS, Div. of Occupational Health, Cincinnati, Ohio).
Annals of the New York Academy of Sciences, vol. 134, Art. 2, Feb. 28, 1966, p. 743–749.

An approach is made to the problem of presenting information on the probable reaction of exposed persons to various thermal combinations, under a variety of physiological and clinical states, using several criteria of physiological significance. A choice was made of certain mathematical expressions of heat exchange, the concept of relative strain, and certain broad criteria of effects. The actual use of the scheme involves (1) a determination of any adjustment of actual air temperature needed to compensate for other than standard values assigned to metabolic rate, air movement, radiant heat, or clothing; (2) entering the adjusted value into the psychrometric chart and reading off the corresponding value of relative strain; and (3) reading off the chart the probable effects indicated for the value of the relative strain.

A66-81420
VARIATION IN HEAT PRODUCTION DURING ACUTE EXPOSURES OF MEN AND WOMEN TO COLD AIR OR WATER.
E. R. Buskirk (Pa. State U., Inst. for Sci. and Eng., Lab. for Human Performance Res., University Park).
Annals of the New York Academy of Sciences, vol. 134, Art. 2, Feb. 28, 1966, p. 733–742. 51 refs.
Grant PHS AM08311.

Several factors must be considered in studies of human adaptibility to cold. Large individual variations are observed due to different amounts of peripheral insulation, i.e., adipose tissue. This variation tends to be greater among lean individuals. Different results are obtained depending on the type of cold exposure and the artificial insulation employed. The metabolic responses to cold may serve as an important parameter, but frequent movements and shivering during sleep or rest may elevate metabolism and produce artifacts.

A66-81421
SENSORY RESTRICTION: EFFECTS ON BEHAVIOR.
Duane P. Schultz (U. of Va., Mary Wash. Coll., Dept. of Psychol., Fredericksburg).
Academic Press, New York, 1965. viii+ 216 p. 243 refs.
$7.50

An attempt is made to provide a systematic presentation of experimental findings in the area of sensory deprivation, as empirical support for the proposition that man needs varying sensory stimulation in order to function adaptively. The correlations between arousal and the reticular activating system, the hypothalamus, and the level of stimulus variation are discussed in a theoretical framework. The physiological, cognitive and learning, and perceptual and motor effects; the effective changes; and the differences in tolerance to sensory restriction are examined. The effects of individual and small group social isolation are also discussed.

A66-81422
A STUDY OF TEMPERATURE CONDITIONS OPTIMAL FOR A THERMOPHILOUS STRAIN OF CHLORELLA [ISSLEDOVANIE OPTIMAL'NYKH TEMPERATURNYKH REZHIMOV TERMOFIL'NOGO SHTAMMA KHLORELLY].
I. V. Sminov.
Doklady Adademii Nauk SSSR, vol. 167, Apr. 21, 1966, p. 1405–1408. 12 refs. In Russian.

Experimental studies of optimal temperature conditions for a thermophilic strain of Chlorella disclosed a mathematical relationship between the intensity of artificial illumination and the ambient temperature: with an increase in the light intensity the temperature must be raised for maximal yield. This shift is expressed by an empirical exponential relationship. However, if the range of the light intensity change is small, such as in the region of 100×10^3 to 300×10^3 erg/cm.^{2} sec., the temperature stabilizes at 39°C. The yield at this point decreases not more than 1–2%, as compared with a maximum.

A66-81423
THE CONTENT OF AMINO-ACIDS IN DIFFERENT PARTS OF THE ENCEPHALON UNDER CONDITIONS OF HYPEROXIA [SODERZHANIE AMINOKISLOT V OTDELAKH GOLOVNOGO MOZGA PRI GIPEROK SII].
T. N. Pogorelova.
Doklady Akademii Nauk SSSR, vol. 167, Apr. 21, 1966, p. 1421–1422. 10 refs.

In rabbits subjected to hyperoxia by breathing oxygen under pressure, the content of amino acids in certain brain areas was determined during a period of convulsions and in the pre-convulsion phase. In normal animals the amount of amino acids in the cerebral hemispheres and in the optic thalamus was higher than in other areas. In all brain areas the amino acids involved in the Krebs tricarboxylic cycle (glutamic acid, aspartic acid, and alanine) and those connected with ammonia metabolism (glutamine and gamma-aminobutyric acid) were elevated more than other amino acids. During the pre-convulsion stage the amount of glutamine was decreased by 16.4%, and in the optic thalamus by 9.7%. In all other areas aspartic acid, cystine, alanine, and threonine were lower than normal. During convulsions the glutamic acid content was increased by 7.4–14.8% in all areas. Glutamine was decreased by 9.3–13.2% and gamma-aminobutyric acid by 17.3–40.7%. In the optic thalamus, glutamic acid and glutamine content was not affected, but gamma-aminobutyric acid was decreased by 17.4%. Other acids showed either increase or decrease in different areas. These changes could be due to the oxygen toxic effect at certain points of the metabolic cycle of each individual acid.

A66-81424
ACTIVATION OF THE PITUITARY-ADRENAL AXIS DURING RAPID EYE MOVEMENT SLEEP IN MAN.
M. P. Mandell, A. J. Mandell, R. T. Rubin, P. Brill, J. Rodnick, R. Sheff, and B. Chaffey (Calif., U. Center for Health Sci., Depts. of Psychiatry and Urol., Biochem. Correlates Lab. and Brentwood Veterans Admin. Hosp., Los Angeles).
Life Sciences, vol. 5, Apr. 1966, p. 583–587. 11 refs.

Catheterized urology patients had increases in urinary 17-hydroxycorticoids regularly associated with rapid eye movement state (REMS) epochs when they were studied electrophysiologically all night, with their urinary catheter output connected to a volume driven fraction collector.

A66-81425
A 24-HOUR RHYTHM IN THE CONTENT OF NOREPINEPHRINE IN THE PINEAL AND SALIVARY GLANDS OF THE RAT.
Richard J. Wurtman and Julius Axelrod (Natl. Inst. of Mental Health, Lab. of Clin. Sci., Bethesda, Md.)
Life Sciences, vol. 5, Apr. 1966, p. 665–669. 12 refs.

Studies in rats showed that the norepinephrine level of the pineal body varies over a three-fold range during a 24-hr. period. This circadian rhythm is similar to that of the submaxillary gland. These findings indicate that the activity of part of the sympathetic nervous system is related to environmental lighting and to the time of day. The norepinephrine content of the pineal gland was highest at the end of the dark period, and fell during the light period, reaching the lowest level at seven o'clock in the evening. The norepinephrine content of the submaxillary gland was about twice as high at the end of the dark period than it was at the midpoint of the light period.

Subject Index

AEROSPACE MEDICINE AND BIOLOGY / *a continuing bibliography* AUGUST 1966

Listing of Subject Headings of Reports

A Notation of Content, rather than the title of the document, appears under each subject heading; it is listed under several headings to provide multiple access to the subject content. The accession number is located beneath and to the right of the Notation of Content, e.g., N66-12345. Under any one subject heading, the accession numbers are arranged in sequence.

B

D

E

F

G

H

M

N

O

Q

R

S

T

U

V

W

N66-24198

X

Y

Corporate Source Index

Listing of Reports by Source

A Notation of Content, rather than the title of the document, appears under each corporate source. The accession number is located beneath and to the right of the Notation of Content, e.g., N66-12345. Under any one corporate source, the accession numbers are arranged in sequence.

A

B

C

D

J

O

P

R

S

V

W

Personal Author Index

Listing of Personal Authors of Reports

A Notation of Content, rather than the title of the document, appears under each author's name. The accession number is located beneath and to the right of the Notation of Content, e.g., N66-12345. Under any one author's name, the accession numbers are arranged in sequence.

A

B

C

D

E

F

G

H

J

K

L

M

N

O

P

Q

R

S

T

U

V

W

Y

Z

Collections of NASA Documents

NASA is depositing its technical documents and bibliographic tools in eleven Federal Regional Technical Report Centers. Each Center, located in the organizations listed below, is prepared to furnish the general public such services as personal reference, inter-library loans, photocopy service, and assistance in obtaining retention copies of NASA documents.

California: University of California, Berkeley
Colorado: University of Colorado Libraries, Boulder
District of Columbia: Library of Congress
Georgia: Georgia Institute of Technology, Atlanta
Illinois: The John Crerar Library, Chicago
Massachusetts: MIT, Cambridge
Missouri: Linda Hall Library, Kansas City
New York: Columbia University, New York
Pennsylvania: Carnegie Library of Pittsburgh
Texas: Southern Methodist University, Dallas
Washington: University of Washington Library, Seattle

In addition, NASA publications are currently being forwarded to the public libraries in the cities listed below:

Alabama: Birmingham
Alaska: Anchorage
Arizona: Phoenix
Arkansas: Little Rock
California: Los Angeles, Oakland, San Diego, San Francisco
Colorado: Denver
Connecticut: Hartford, Bridgeport
Delaware: Wilmington
Florida: Miami
Louisiana: New Orleans
Maryland: Enoch Pratt Free Library, Baltimore
Massachusetts: Boston
Michigan: Detroit
Minnesota: St. Paul
Missouri: Kansas City, St. Louis
New Jersey: Trenton
New York: New York State Library, Brooklyn, Buffalo, Rochester
North Carolina: Charlotte
Ohio: Cleveland, Cincinnati, Dayton, Toledo
Oklahoma: Oklahoma City
Pennsylvania: Pittsburgh
Tennessee: Memphis
Texas: Fort Worth, San Antonio
Washington: Seattle
Wisconsin: Milwaukee

An extensive collection of NASA and NASA-sponsored scientific and technical publications available to the public for reference purposes is maintained at the Technical Information Service, American Institute of Aeronautics and Astronautics, 750 Third Avenue, New York, New York, 10017.

"The aeronautical and space activities of the United States shall be conducted so as to contribute . . . to the expansion of human knowledge of phenomena in the atmosphere and space. The Administration shall provide for the widest practicable and appropriate dissemination of information concerning its activities and the results thereof."

—NATIONAL AERONAUTICS AND SPACE ACT OF 1958

NASA SCIENTIFIC AND TECHNICAL PUBLICATIONS

TECHNICAL REPORTS: Scientific and technical information considered important, complete, and a lasting contribution to existing knowledge.

TECHNICAL NOTES: Information less broad in scope but nevertheless of importance as a contribution to existing knowledge.

TECHNICAL MEMORANDUMS: Information receiving limited distribution because of preliminary data, security classification, or other reasons.

CONTRACTOR REPORTS: Technical information generated in connection with a NASA contract or grant and released under NASA auspices.

TECHNICAL TRANSLATIONS: Information published in a foreign language considered to merit NASA distribution in English.

SPECIAL PUBLICATIONS: Information derived from or of value to NASA activities. Publications include conference proceedings, monographs, data compilations, handbooks, sourcebooks, and special bibliographies.

TECHNOLOGY UTILIZATION PUBLICATIONS: Information on technology used by NASA that may be of particular interest in commercial and other nonaerospace applications. Publications include Tech Briefs; Technology Utilization Reports and Notes; and Technology Surveys.

Details on the availability of these publications may be obtained from:

SCIENTIFIC AND TECHNICAL INFORMATION DIVISION

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Washington, D.C. 20546